

SD-TR-85-31



AD-A157 208

**INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH
SUNNYVALE AIR FORCE STATION, CALIFORNIA**

FINAL REPORT

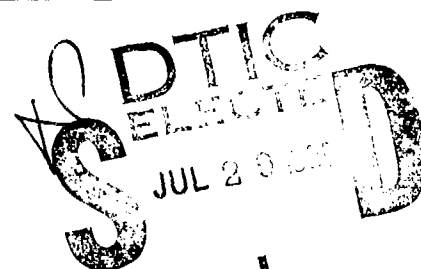
**PREPARED FOR
DEPARTMENT OF THE AIR FORCE
HQ SPACE DIVISION (DEV)
P.O. BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES, CALIFORNIA 90009**

JULY 1985

Approved for public release; distribution unlimited.

DTIC FILE COPY

**ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
P.O. BOX ESE
GAINESVILLE, FLORIDA 32602**



85 7 16 057

NOTICE

This report has been prepared for the U.S. Air Force by Environmental Science and Engineering, Inc., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the U.S. Air Force, or the Department of Defense.

Copies of this report may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal government agencies and their contractors registered with Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314



| | |
|---------------|-------------------------------------|
| Accession For | |
| NTIS GRA&I | <input checked="" type="checkbox"/> |
| DTIC TAB | <input type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| Justification | |
| By | |
| Distribution/ | |
| Availability | |
| Dist | Avail. and/or Spec'd |
| A-1 | |

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE | | READ INSTRUCTIONS BEFORE COMPLETING FORM |
|---|---|--|
| 1. REPORT NUMBER SD-TR-85-31 | 2. GOVT ACCESSION NO. AD-A157 208 | 3. RECIPIENT'S CATALOG NUMBER |
| 4. TITLE (and Subtitle) Installation Restoration Program Phase I: Records Search, Sunnyvale Air Force Station, California | | 5. TYPE OF REPORT & PERIOD COVERED Final Sept. 25, 1984-July 1, 1985 |
| 7. AUTHOR(s) C.D. Hendry, D.F. McNeill, A.P. Hubbard, J.J. Kosik, L.D. Tournade, and M.D. Stewart | | 6. PERFORMING ORG. REPORT NUMBER IRP-I-SAFS |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS Environmental Science and Engineering, Inc. P.O. Box ESE Gainesville, Florida 32602 | | 8. CONTRACT OR GRANT NUMBER(s) FO4701-84-C-0115 |
| 11. CONTROLLING OFFICE NAME AND ADDRESS SD/DEV Los Angeles AFS P.O. Box 92960 WWPC Los Angeles, California 90009 | | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) SD/DEV Los Angeles AFS P.O. Box 92960 WWPC Los Angeles, California 90009 | | 12. REPORT DATE July 1985 |
| | | 13. NUMBER OF PAGES 133 |
| | | 15. SECURITY CLASS. (of this report) Unclassified |
| | | 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE Not Applicable |
| 16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release: Distribution Unlimited | | |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) | | |
| 18. SUPPLEMENTARY NOTES This program was conducted with the assistance of AFESC/DEVP, Tyndall AFB, Florida, and AFSC/DEMV, Andrews AFB, Maryland. It will be used by the U.S. Air Force Occupational and Environmental Health Laboratory to conduct Phase II actions. Point of contact was Mr. Larry Evans, AFSCF/DEP. | | |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Sunnyvale AFS Civil Engineering Hazardous Waste Environmental Planning Hazardous Materials Hydrology Installation Restoration Program Ground Water Aquifer | | |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) An Installation Restoration Program Phase I Records Search was conducted of Sunnyvale Air Force Station and Camp Parks Communication Annex from Jan. 18 to Jan. 31, 1985. Past and current employees were interviewed, records were reviewed, regulatory agencies were contacted, and a ground reconnaissance was conducted. Past waste handling and disposal practices were evaluated, and six past waste disposal or spill sites were identified. The sites were evaluated for potential for contamination and migration of contaminants using a decision tree process. All six sites were found | | |

DD FORM 1 JAN 73 1473

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. ABSTRACT (Continued)

✓ to have no potential for residual contamination and/or contaminant migration. Therefore, no Phase II confirmatory sampling and analysis programs are recommended for these sites. Operations at two sites need to be reviewed by the base environmental program and modifications made in accordance with state and federal regulations. *Originator-supplied keywords:*

In field 19

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

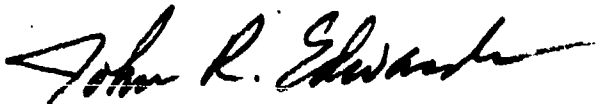
PREFACE

The Installation Restoration Program Phase I: Records Search, Sunnyvale Air Force Station, California was prepared by Environmental Science and Engineering, Inc., Gainesville, Florida.

It describes the installation missions, environment including geology and hydrology, findings of the records search for past hazardous material disposal sites, conclusions and recommendations. It will be used to identify and control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from past disposal practices.

This work was initiated in September, 1984 and was completed in July, 1985. Mr. John R. Edwards, Headquarters Space Division was the Project Manager.

This report has been reviewed by the office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At the NTIS, it will be available to the general public, including foreign nations.



JOHN R. EDWARDS
Environmental Engineer



RAPHAEL O. ROIG
Chief, Environmental Planning Div.



RAYMOND E. RODGERS, JR., COL USAF
Director of Acquisition Civil Engineering

INSTALLATION RESTORATION PROGRAM

PHASE I: RECORDS SEARCH

SUNNYVALE AIR FORCE STATION, CALIFORNIA

Prepared for:

**UNITED STATES AIR FORCE
HQ SD/DEV
Los Angeles AFS, California**

Prepared by:

**ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida**

July 1985

NOTICE

This report has been prepared for the U.S. Air Force by Environmental Science and Engineering, Inc., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the U.S. Air Force, or the Department of Defense.

Copies of this report may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal government agencies and their contractors registered with Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314

TABLE OF CONTENTS

| <u>Section</u> | <u>Page</u> |
|--|-------------|
| EXECUTIVE SUMMARY | 1 |
| 1.0 INTRODUCTION | 1-1 |
| 1.1 <u>BACKGROUND</u> | 1-1 |
| 1.2 <u>PURPOSE, AUTHORITY, AND SCOPE OF THE ASSESSMENT</u> | 1-2 |
| 1.3 <u>METHODOLOGY</u> | 1-3 |
| 2.0 INSTALLATION DESCRIPTION | 2-1 |
| 2.1 <u>LOCATION, SIZE, AND BOUNDARIES</u> | 2-1 |
| 2.2 <u>HISTORY</u> | 2-1 |
| 2.3 <u>MISSION AND ORGANIZATION</u> | 2-9 |
| 3.0 ENVIRONMENTAL SETTING | 3-1 |
| 3.1 <u>METEOROLOGY</u> | 3-1 |
| 3.2 <u>GEOGRAPHY</u> | 3-4 |
| 3.2.1 PHYSIOGRAPHY | 3-4 |
| 3.2.2 SURFACE HYDROLOGY | 3-5 |
| 3.3 <u>GEOLOGY</u> | 3-5 |
| 3.3.1 GEOLOGIC SETTING | 3-5 |
| 3.3.2 SOILS | 3-13 |
| 3.3.3 HYDROGEOLOGY | 3-16 |
| 3.4 <u>WATER QUALITY</u> | 3-21 |
| 3.4.1 SURFACE WATER QUALITY | 3-21 |
| 3.4.2 GROUND WATER QUALITY | 3-23 |
| 3.4.3 POTABLE WATER QUALITY | 3-26 |
| 3.5 <u>BIOTIC COMMUNITIES</u> | 3-27 |
| 3.6 <u>ENVIRONMENTAL SETTING SUMMARY</u> | 3-28 |
| 4.0 FINDINGS | 4-1 |
| 4.1 <u>CURRENT AND PAST ACTIVITY REVIEW</u> | 4-1 |
| 4.1.1 INDUSTRIAL OPERATIONS | 4-2 |
| 4.1.2 LABORATORY ACTIVITIES | 4-9 |
| 4.1.3 PESTICIDE HANDLING, STORAGE, AND DISPOSAL | 4-9 |

TABLE OF CONTENTS
(Continued, Page 2 of 2)

| <u>Section</u> | <u>Page</u> |
|---|-------------|
| 4.1.4 PCB HANDLING, STORAGE, AND DISPOSAL | 4-12 |
| 4.1.5 POL HANDLING, STORAGE, AND DISPOSAL | 4-15 |
| 4.1.6 RADIOACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL | 4-16 |
| 4.1.7 EXPLOSIVE/REACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL | 4-16 |
| 4.2 <u>WASTE DISPOSAL METHODS AND DISPOSAL SITE IDENTI- FICATION, EVALUATION, AND HAZARD ASSESSMENT</u> | 4-18 |
| 4.2.1 STORMWATER DRAINAGE DISPOSAL SITES | 4-18 |
| 4.2.2 LANDFILLS | 4-21 |
| 4.2.3 FUEL SPILL SITES | 4-21 |
| 4.2.4 FIREFIGHTER TRAINING AREA | 4-23 |
| 4.2.5 CHEMICAL DISPOSAL SITES | 4-23 |
| 4.2.6 HAZARD EVALUATION ASSESSMENT | 4-26 |
| 5.0 CONCLUSIONS | 5-1 |
| 6.0 RECOMMENDATIONS | 6-1 |
| BIBLIOGRAPHY | |
| APPENDICES | |
| A--GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS | |
| B--TEAM MEMBER BIOGRAPHICAL DATA | |
| C--LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS | |
| D--ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES | |
| E--MASTER LIST OF SHOPS AND LABS | |
| F--WATER QUALITY DATA | |
| G--USAF IRP HAZARD ASSESSMENT RATING METHODOLOGY | |
| H--PHOTOGRAPH OF SUNNYVALE AFS | |

LIST OF TABLES

| <u>Table</u> | <u>Page</u> |
|---|-------------|
| 1 Summary of Information on Potential Contamination Sites on SAFS and CPCA | 7 |
| 2.2-1 Chronology of Historical Events and Organizational Changes for SAFS | 2-5 |
| 3.1-1 Climatological Data for SAFS | 3-2 |
| 3.1-2 Climatological Data for CPCA | 3-3 |
| 3.3-1 Generalized Geologic Section in Vicinity of SAFS | 3-9 |
| 3.4-1 Summary of Water Quality Data for Streams in the Vicinity of SAFS | 3-22 |
| 3.4-2 Summary of Ground Water Quality Data for PRFTA Wells | 3-24 |
| 4.1-1 Sunnyvale AFS Industrial Operations--Waste Generation | 4-3 |
| 4.1-2 Camp Parks Communications Annex Industrial Operations--Waste Generation | 4-10 |
| 4.1-3 Sunnyvale AFS Laboratory Operations--Waste Generation | 4-11 |
| 4.1-4 SAFS Pesticides Inventory | 4-13 |
| 4.1-5 PCB Transformers on SAFS | 4-14 |
| 4.2-1 Summary of Information on SAFS Stormwater Drainage System Disposal Sites | 4-19 |
| 4.2-2 Summary of Decision Process Logic for Areas of Initial Environmental Concern at SAFS and CPCA | 4-27 |
| 5.0-1 Summary of Information on Potential Contamination Sites on SAFS and CPCA | 5-2 |

LIST OF FIGURES

| <u>Figure</u> | | <u>Page</u> |
|---------------|--|-------------|
| 1 | Locations of Potential Contamination Sites on SAFS | 8 |
| 2 | Location of Potential Contamination Site on Camp Parks Communications Annex | 9 |
| 1.3-1 | Decision Process | 1-5 |
| 2.1-1 | Location Map | 2-2 |
| 2.1-2 | Site Map of Sunnyvale Air Force Station | 2-3 |
| 2.1-3 | Site Map of Camp Parks Communications Annex | 2-4 |
| 3.2-1 | Stormwater Drainage System on SAFS | 3-6 |
| 3.3-1 | Regional Geologic Features in Vicinity of SAFS | 3-8 |
| 3.3-2 | Surficial Geology in Vicinity of SAFS | 3-11 |
| 3.3-3 | Typical Lithologic Soil Profiles at SAFS | 3-12 |
| 3.3-4 | Geologic Log and Well Construction for CPCA Water Supply Well | 3-14 |
| 3.3-5 | General Soil Types in Vicinity of SAFS | 3-15 |
| 3.3-6 | Generalized Geologic and Hydrogeologic Section in the Vicinity of SAFS | 3-17 |
| 3.3-7 | Potentiometric Surface (ft MSL) of the Upper Aquifer in Vicinity of SAFS | 3-19 |
| 3.4-1 | Area Map Showing the Location of Parks Reserve Forces Training Area Well Fields | 3-25 |
| 4.2-1 | Stormwater Drainage Disposal Sites on SAFS | 4-20 |
| 4.2-2 | Fuel Spill Sites on SAFS | 4-22 |
| 4.2-3 | Location of Wet-Well Disposal Site DS-1 | 4-24 |
| 4.2-4 | Locations and Construction Detail for the Dry Wells Adjacent to Bldg. 2001 at CPCA | 4-25 |

LIST OF FIGURES
(Continued, Page 2 of 2)

| <u>Figure</u> | | <u>Page</u> |
|---------------|--|-------------|
| 5.0-1 | Locations of Potential Contamination Sites on SAFS | 5-3 |
| 5.0-2 | Location of Potential Contamination Site on Camp Parks Communications Annex | 5-4 |

EXECUTIVE SUMMARY

INTRODUCTION

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is known as the Installation Restoration Program (IRP) and consists of four phases: Phase I--Initial Assessment/Records Search, Phase II--Confirmation and Quantification, Phase III--Technology Base Development, and Phase IV--Operations/Remedial Actions. Environmental Science and Engineering, Inc. (ESE) conducted the Phase I study of Sunnyvale Air Force Station (SAFS) and Camp Parks Communications Annex (CPCA), with funds provided by the Air Force Systems Command (AFSC).

INSTALLATION DESCRIPTION

SAFS is situated approximately 40 miles southeast of San Francisco in Santa Clara County, Calif., near the southwest edge of San Francisco Bay. The station occupies 19.6 acres bounded on the east by Mathilda Ave., on the south by Moffett Drive, and on the west by Lockheed Way. The property north and west of SAFS is owned by Prudential Insurance Co. and leased by Lockheed Missile and Space Co. The property south of SAFS is completely developed, and the land east of Mathilda Ave. has been developed for commercial use. SAFS housing is located on Naval Air Station Moffett Field, approximately 2 miles north of SAFS. A photograph of SAFS is presented in App. H.

CPCA is situated approximately 23 miles northeast of SAFS in Alameda County, Calif. The annex occupies 11.6 acres southeast of Dublin, Calif., directly north of Pleasanton, Calif. The interchange of Interstate Highways 580 and 680 is immediately southwest of the

installation. CPCA is located in an isolated area at the top of a hill and consists of several communication towers and buildings.

HISTORY

Sunnyvale AFS

The Air Force Satellite Control Facility (AFSCF) at SAFS evolved from the Air Force ballistic missile development program and the establishment of a west coast field office to manage the nation's first intercontinental ballistic missile (ICBM) program. In August 1958, a 20-man field office was activated in Palo Alto, Calif., to achieve an early orbital capability with the Thor booster and to support an aerobiomedical program to assist in the development of the U.S. Man-in-Space program. In January 1959, Lockheed Missile Systems Division completed an interim satellite control center at Palo Alto. In March 1960, the operation was moved from Palo Alto to Sunnyvale, where an interim control center was established by Lockheed. By the end of June 1960, the Satellite Test Center (STC) was activated on a portion of 11.4 acres of land purchased by the Air Force in the southeast corner of the Lockheed complex (AFSCF, 1982). The STC was redesignated the Satellite Test Annex (STA) in July 1960. In 1969, USAF purchased an additional 8.2 acres, adjacent to the 11.4 acres purchased in 1960, from Lockheed Aircraft Corp. This purchase increased the acreage of the station to 19.6 acres. The station was redesignated SAFS in January 1971.

Camp Parks Communications Annex

CPCA is located within an area known as the Parks Reserve Forces Training Area (PRFTA), which is a subinstallation of the U.S. Army's Presidio of San Francisco (PSF). The 11.6 acres that comprise CPCA have been operated as a radiometric test facility since 1961. In 1970, AFSCF assumed responsibility for the Camp Parks Radiometric Test Facility, and in 1972 the facilities and land were officially transferred from the Army to the Air Force. The facility was redesignated CPCA in 1975.

ENVIRONMENTAL SETTING

Sunnyvale AFS

Most of the area surrounding SAFS consists of a gently sloping, nearly level area that contains residential housing located approximately 1,000 feet (ft) southeast of the facility, commercial establishments, paved streets, and parking areas. Elevations in the vicinity SAFS range from 40 ft above mean sea level (MSL) to sea level.

The station is drained by a small canal that borders the southern and eastern edges of the installation. Because a majority of SAFS consists of buildings and paved parking areas, most rainfall drains off the station as stormwater runoff.

SAFS has a mild, Mediterranean-type climate, with temperatures moderated by San Francisco Bay. The average monthly temperature ranges from a low of 48.0°F in January to a high of 65.5°F in July. The average annual rainfall is 12.99 inches, 83 percent of which occurs from November through March. Net precipitation is -29.01 inches per year, and the 1-year, 24-hour rainfall event is 3 inches. The low value for net precipitation indicates a low potential for significant infiltration or the formation of permanent surface water features. The 1-year, 24-hour rainfall event of 3 inches indicates a moderate potential for runoff and erosion. The majority of the installation, however, is asphalt-paved and contains stormwater drainage systems to control runoff, thus eliminating any significant potential for flooding and soil erosion.

The surficial lithology of SAFS consists of alluvial deposits of the San Jose Plain. Underlying the recent alluvium deposits is the Pleistocene Santa Clara Formation, which consists of nonmarine conglomerates, sandstones, siltstones, and clays. Underlying this formation, various marine sedimentary and volcanic units overlie the basement Franciscan Formation. It has been postulated that a dip-slip type fault is adjacent to SAFS. The extent and depth of subsurface movement along this fault is unknown. No surficial, vertical displacement is visible in the fault zone.

Two major aquifer systems are encountered in the vicinity of SAFS. The lower aquifer occurs at a depth of approximately 200 ft. This aquifer consists of sand and gravel overlain by a confining unit approximately 100 ft thick. Above the confining unit, an upper aquifer system occurs between ground surface and a maximum depth of 100 ft. Lateral ground water movement in the upper and lower aquifers would be approximately 100 ft per year. Migration of any contaminant entering the ground water system would be in a northerly direction with some downward movement. Saltwater intrusion has occurred in the upper aquifer adjacent to San Francisco Bay from heavy pumping of the aquifer.

As a result of the developed nature of the installation and its urban location, wildlife habitat on or adjacent to the station is small. Vegetation is limited to cultivated species such as ornamental shrubs, bushes, and trees. Various urban bird species forage in the trees and on the lawns. Common rodents (e.g., mice) occur onbase. No state-listed or Federally listed threatened or endangered species are present.

Camp Parks Communications Annex

CPCA is situated approximately 23 miles northeast of SAFS. The 11.6-acre hilltop installation is located southeast of Dublin, Calif., and directly north of Pleasanton, Calif. Elevations at CPCA decrease in all directions from 690 ft above MSL to 640 ft above MSL at the installation boundary. The topographic gradient from Bldg. 2002 to the western boundary of CPCA is approximately -1 ft per 5 ft. Due to the location of CPCA on a hilltop, stormwater drainage occurs rapidly through a system of open ditches and swales. Stormwater runoff drains approximately 0.5 mile east of the installation to Tassajara Creek.

The climate of CPCA is mild, with average monthly temperatures ranging from a low of 45.7°F in January to a high of 71.3°F in July. The average annual temperature is 58.7°F. Average annual rainfall is 14.11 inches, 81 percent of which occurs from November through March.

Net precipitation is -29.90 inches per year, and the 1-year, 24-hour rainfall event is 2 inches. The low value for net precipitation indicates a low potential for significant infiltration. The 1-year, 24-hour rainfall event of 2 inches indicates a moderate potential for runoff and erosion.

CPCA is located in Anador Valley, the western portion of Livermore Valley. The Livermore Valley is composed of a downwarped and faulted sequence of Miocene and Pliocene sandstones and conglomerates. CPCA is underlain by the Pliocene Tassajara Formation, consisting of bedding deposits of sandstone, tuffaceous sandstone, and shale. CPCA is located in a seismically active region, with the Pleasanton Fault suspected approximately 2.5 miles west of the annex.

CPCA is underlain by the Camp subbasin, a portion of the Livermore Valley Ground Water Basin. The subbasin covers an area of 2,858 acres and is drained by Tassajara Creek and Cottonwood Creek. Well yields are relatively low in the Camp subbasin due to the presence of shale units with low permeability. Recharge to the aquifer system occurs through infiltration of precipitation within the outcrop areas.

The habitat of CPCA is predominantly valley grasslands with small areas of altered habitat. The grasslands are occupied primarily by a variety of introduced species. Common grasses include wild oats, western rye grasses, common barley, and common foxtail.

Grasslands support a variety of wildlife, including mammals, birds, and reptiles. Common mammals include mice, moles, gophers, and hares.

A variety of large predatory birds and mammals occur in proximity to the site; however, these species probably do not occur onsite because of the small size of CPCA. Common birds of the property include American kestrel, burrowing owl, sparrows, blackbirds, finches, and larks. Reptiles found onbase consist of lizards, snakes, and skinks.

METHODOLOGY

During the course of the Phase I investigation of SAFS and CPCA, interviews were conducted with base personnel (past and current) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state, and Federal agencies; and ground reconnaissance inspections were conducted at past hazardous waste activity sites.

The review of past operation and maintenance functions and past waste management practices at SAFS/CPCA resulted in the identification of six sites that were initially considered areas of concern, with potential for contamination.

FINDINGS AND CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the potential for contaminant migration from these sites.

Six sites were initially considered areas of concern with potential for contamination. A list of these sites and a summary of the evaluations of each site are presented in Table 1. Fig. 1 shows the site locations on SAFS, and Fig. 2 shows the site location on CPCA. Two of these sites were former stormwater drainage disposal sites that have little potential for residual contamination. One site (Site No. 2) is an operating stormwater drainage disposal site that may require an industrial discharge permit; therefore, this site was determined to warrant review and modification under the base environmental program. Three sites were fuel spill sites at which cleanup operations were sufficient and little residual contamination remained. A sink drain disposal site (Site No. 6) on CPCA, while having a potential for residual contamination, does not present potential for migration or for endangerment of human health or environmental quality. This sink drain

Table 1. Summary of Information on Potential Contamination Sites on SAFS and CPCA

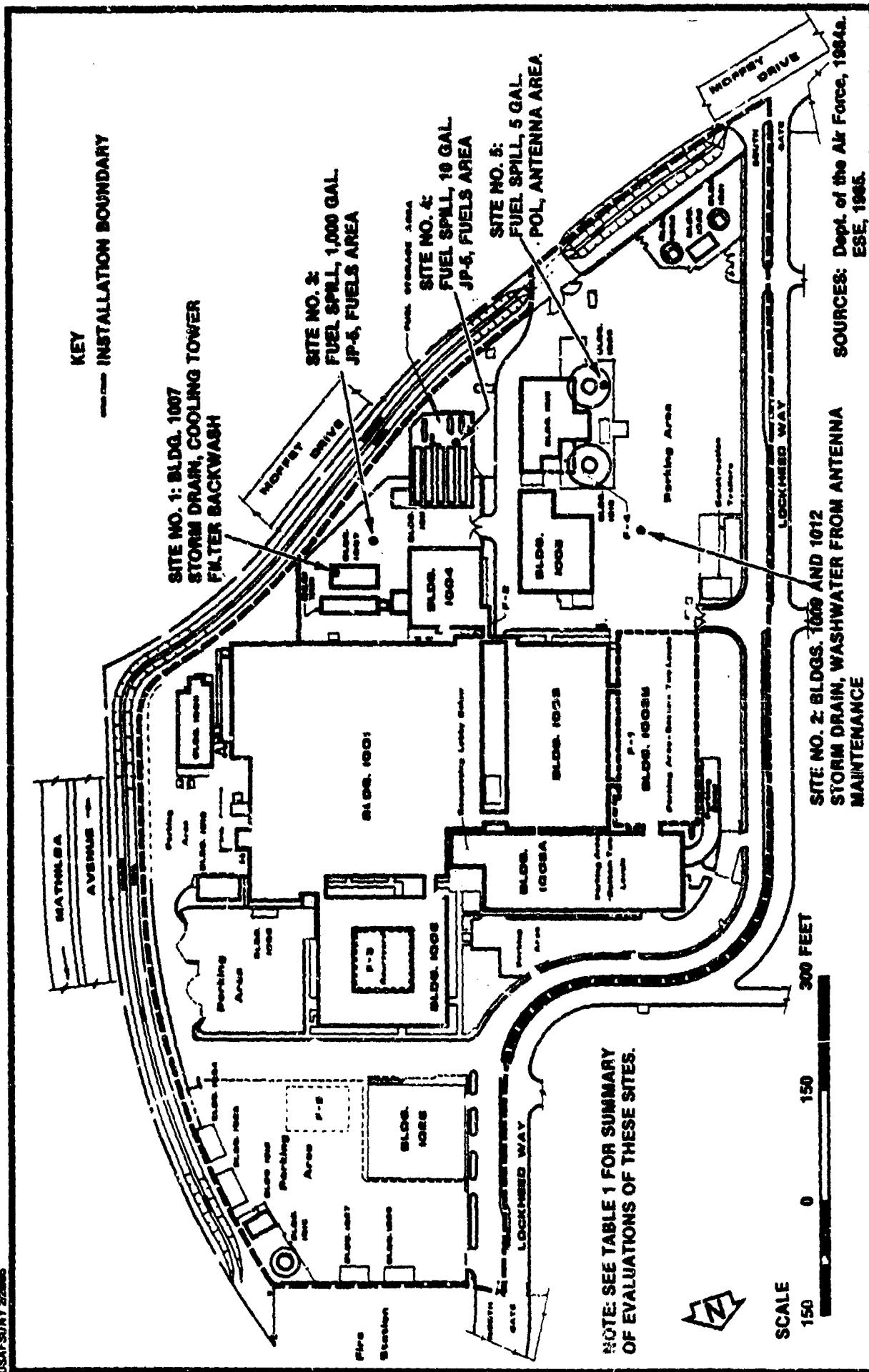
| Site# No. | Site Description | Report Designation | Dates of Operation or Occurrence | Waste Description | Conclusion |
|--------------|--|-----------------------|--|---|---|
| 1 | Storm Drain, Bldg. 1007, Cooling Filter Backwash | SD-1 | 1979-1982 | Filter backwash containing suspended solids | No potential for con- tamination. Disposal over practice ceased. |
| 2 | Storm Drain, Bldgs. 1009 and 1012, Wastewater from Antenna Maintenance | SD-2 | 1976-Present | Wastewater from antenna maintenance containing an alkaline detergent-based aircraft-cleaning compound | No potential for resid- ual contamination. Refer to base environ- mental program for review of operation.† |
| 3 | Fuel Spill, 1,000 gal JP-5, Fuels Area | FS-1 | March, 1980 | 1,000 gal JP-5 | No potential for resid- ual contamination. Spill cleanup by SAFS. |
| 4 | Fuel Spill, 10 gal JP-5, Fuels Area | FS-2 | 1980 | 10 gal JP-5 | No potential for resid- ual contamination. Spill cleanup by SAFS. |
| 5 | Fuel Spill, 5 gal POL, Antenna Area | FS-3 | 1983 | 5 gal POL | No potential for resid- ual contamination. Spill cleanup by SAFS. |
| 6 | CPCA Bldg. 2001 Wet Well Disposal Site | DS-1 | 1960-Present | Wastewater from main- tenance area sink drain. Diluted small quantities of various chemicals used in maintenance operations. | Potential for residual contamination. No potential for migration or endangerment of Human Health or Environment.** |

*Site Nos. 1 through 5 located on SAFS (Fig. 1); Site No. 6 located on CPCA (Fig. 2).

†Subsequent to the site visit, it was reported that preliminary plans are being developed to connect the wet well disposal system to the sanitary sewer disposal system.

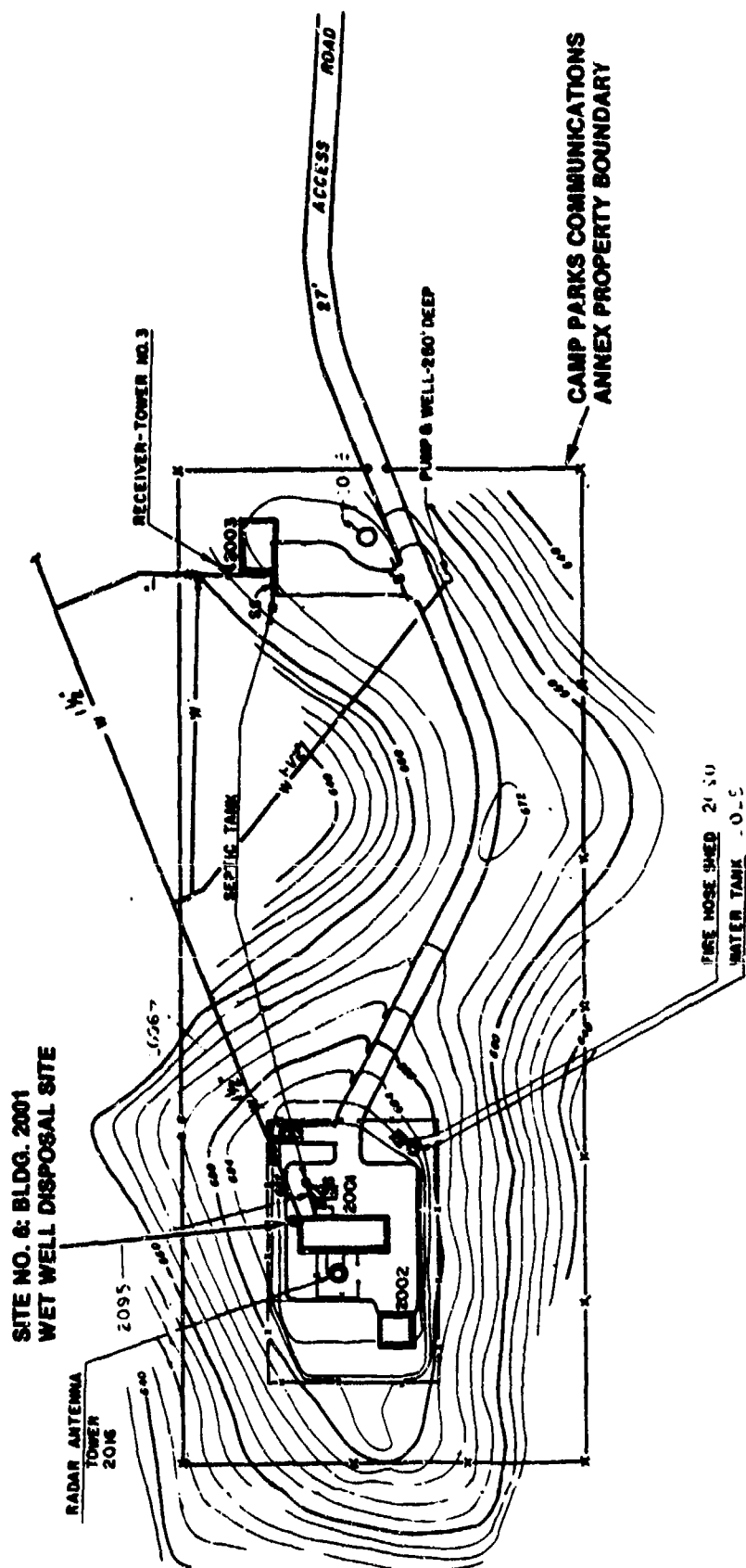
**Subsequent to the site visit, it was reported that preliminary plans are being developed to connect the wet well disposal system to the sanitary sewer disposal system.

Source: ESE, 1985.



INSTALLATION RESTORATION PROGRAM SUNNYVALE AIR FORCE STATION

**Figure 1
LOCATIONS OF POTENTIAL CONTAMINATION SITES ON SAFS**



NOTE: SEE TABLE 1 FOR SUMMARY EVALUATION OF SITE NO. 6.

SCALE

100 0 100 200 FEET

Figure 2
LOCATION OF POTENTIAL CONTAMINATION SITE ON
CAMP PARKS COMMUNICATIONS ANNEX

**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**

system was also determined to warrant review and modification under the base environmental program.

All six sites were evaluated using the decision process. Because the sites were found to have little or no potential for contamination or contaminant migration, none of the sites were evaluated using the HARM system.

RECOMMENDATIONS

No sites on SAFS/CPCA were identified as having potential for contamination and contaminant migration; therefore, no Phase II actions are recommended. One operating stormwater drainage disposal site (Site No. 2) on SAFS and a sink drain disposal site (Site No. 6) on CPCA need to be reviewed by the base environmental program. Appropriate operational modifications should be made in accordance with state and Federal regulations. (Subsequent to the site visit, it was reported that SAFS has applied to the California Regional Water Quality Control Board for a discharge permit for Site No. 2, and that preliminary plans are being developed to connect the wet well disposal system (Site No. 6) at CPCA to the sanitary sewer disposal system.)

1.0 INTRODUCTION

1.1 BACKGROUND

Due to its primary mission, the U.S. Air Force (USAF) has long been engaged in operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Sec. 6003 of the Act, Federal agencies are directed to assist the U.S. Environmental Protection Agency (EPA), and under Sec. 3012, state agencies are required to inventory past disposal sites and make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, the Department of Defense (DOD) developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated Dec. 11, 1981, and implemented by USAF message dated Jan. 21, 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DOD policy is to identify and fully evaluate suspected problems associated with past waste disposal practices and to control hazards to health and welfare that resulted from these past operations. The IRP will be the basis for response actions on USAF installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as clarified by Executive Order 12316. CERCLA is the primary Federal legislation governing remedial action at the past hazardous waste disposal sites.

1.2 PURPOSE, AUTHORITY, AND SCOPE OF THE ASSESSMENT

The IRP has been developed as a 4-phase program, as follows:

- Phase I--Initial Assessment/Records Search
- Phase II--Confirmation and Quantification
- Phase III--Technology Base Development
- Phase IV--Operations/Remedial Actions

Environmental Science and Engineering, Inc. (ESE) conducted the records search at Sunnyvale Air Force Station (SAFS) and Camp Parks Communications Annex (CPCA), with funds provided by the Air Force Systems Command (AFSC). This report contains a summary and evaluation of the information collected during Phase I of the IRP and recommendations for any necessary Phase II action.

The objective of Phase I was to identify the potential for environmental contamination from past waste disposal practices at SAFS and to assess the potential for contaminant migration. Activities performed in the Phase I study included the following:

1. Review of site records;
2. Interviews with personnel familiar with past generation and disposal activities;
3. Inventory of wastes;
4. Determination of estimated quantities and locations of current and past hazardous waste treatment, storage, and disposal;
5. Definition of the environmental setting at the base;
6. Review of past disposal practices and methods;
7. Performance of field and aerial inspections;
8. Gathering of pertinent information from Federal, state, and local agencies;
9. Assessment of potential for contaminant migration; and
10. Development of conclusions and recommendations for any necessary Phase II action.

ESE performed the onsite portion of the records search during January 1985. The following team of professionals was involved:

- o Charles D. Hendry, Jr., Ph.D., Staff Chemist and Project Manager; Team Leader for the SAFS, Los Angeles Air Force Station (LAAFS), and Fort MacArthur (FMA) records searches; 11 years of professional experience.
- o Allen P. Hubbard, P.E., Engineer, 6 years of professional experience.
- o Jeffrey J. Kosik, Engineer, 3 years of professional experience.
- o Donald F. McNeill, Geologist, 3 years of professional experience.

Detailed information on these individuals is presented in App. B.

1.3 METHODOLOGY

The methodology utilized in the SAFS records search began with a review of past and current industrial operations conducted at the base. Information was obtained from available records such as shop files and real property files, as well as interviews with past and current base employees from the various operating areas. Interviewees included current and former personnel associated with the mission of SAFS and tenant organizations onbase. A list of interviewees, by position and approximate years of service, is presented in App. C.

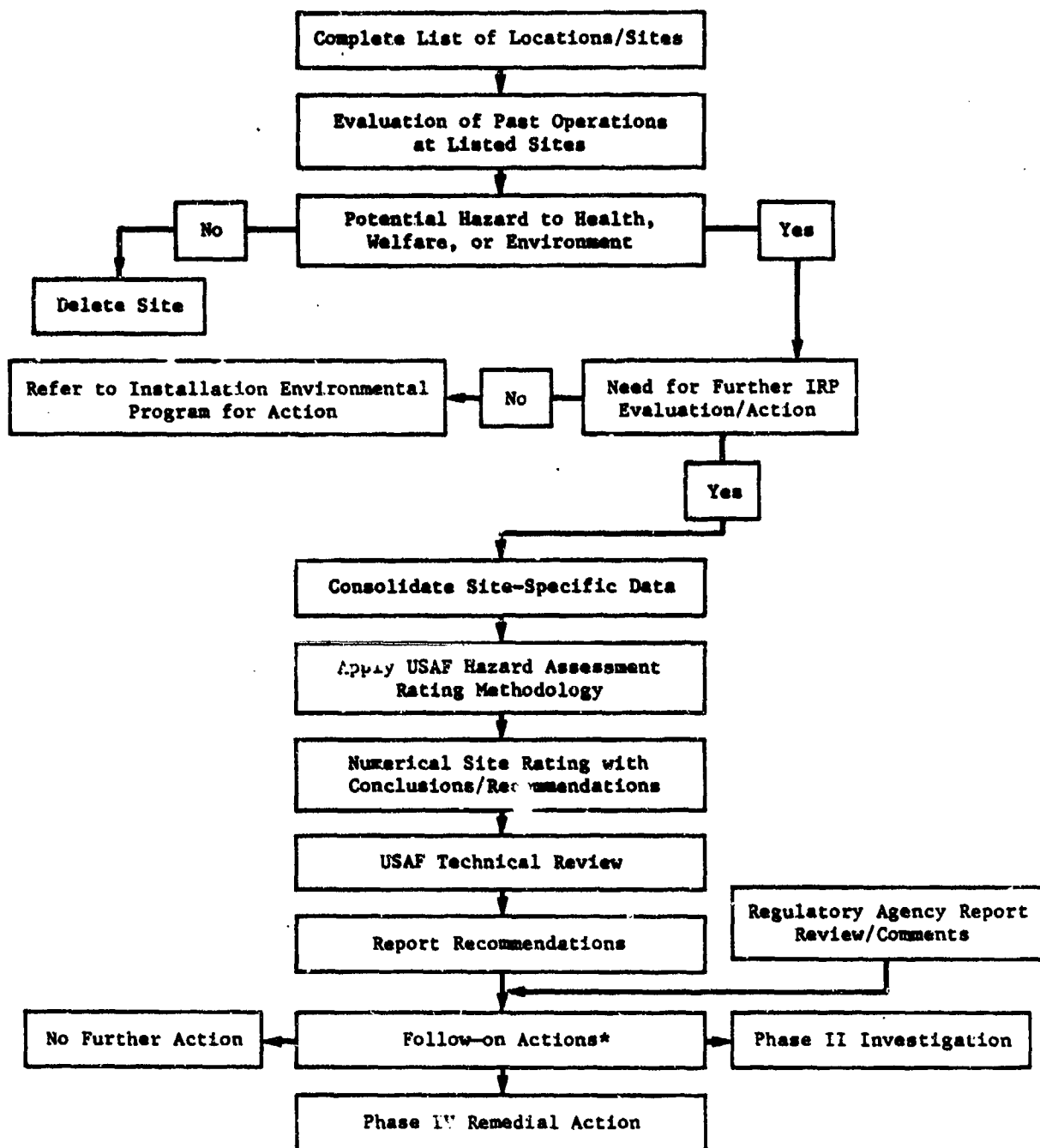
Concurrent with the base interviews, the applicable Federal, state, and local agencies were contacted for pertinent base-related environmental data. The outside records centers and agencies contacted and personnel interviewed are listed in App. C.

The next step in the activity review was to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various operations on the base. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination such as spill areas.

A general ground tour of the identified sites was then made by the ESE Project Team to gather site-specific information including: (1) visual evidence of environmental stress, (2) the presence of drainage ditches and systems, and (3) visual inspection for any obvious signs of contamination or leachate migration. A helicopter overflight was not available as part of the onsite visit.

Using the process shown in Fig. 1.3-1, a decision was then made, based on all of the above information, regarding the potential for hazardous material contamination at any of the identified sites. If no potential existed, the site was deleted from further consideration. If potential for contamination was identified, the potential for migration of the contaminant was assessed based on site-specific conditions. If there were no further environmental concerns, the site was deleted. If the potential for contaminant migration was considered significant, the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM). A discussion of the HARM system is presented in App. G.

PHASE I INSTALLATION RESTORATION PROGRAM RECORDS SEARCH FLOWCHART



*Beyond scope of Phase I.

SOURCES: HQ AFESC, 1983.
ESE, 1985.

Figure 1.3-1
DECISION PROCESS

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

2.0 INSTALLATION DESCRIPTION

2.1 LOCATION, SIZE, AND BOUNDARIES

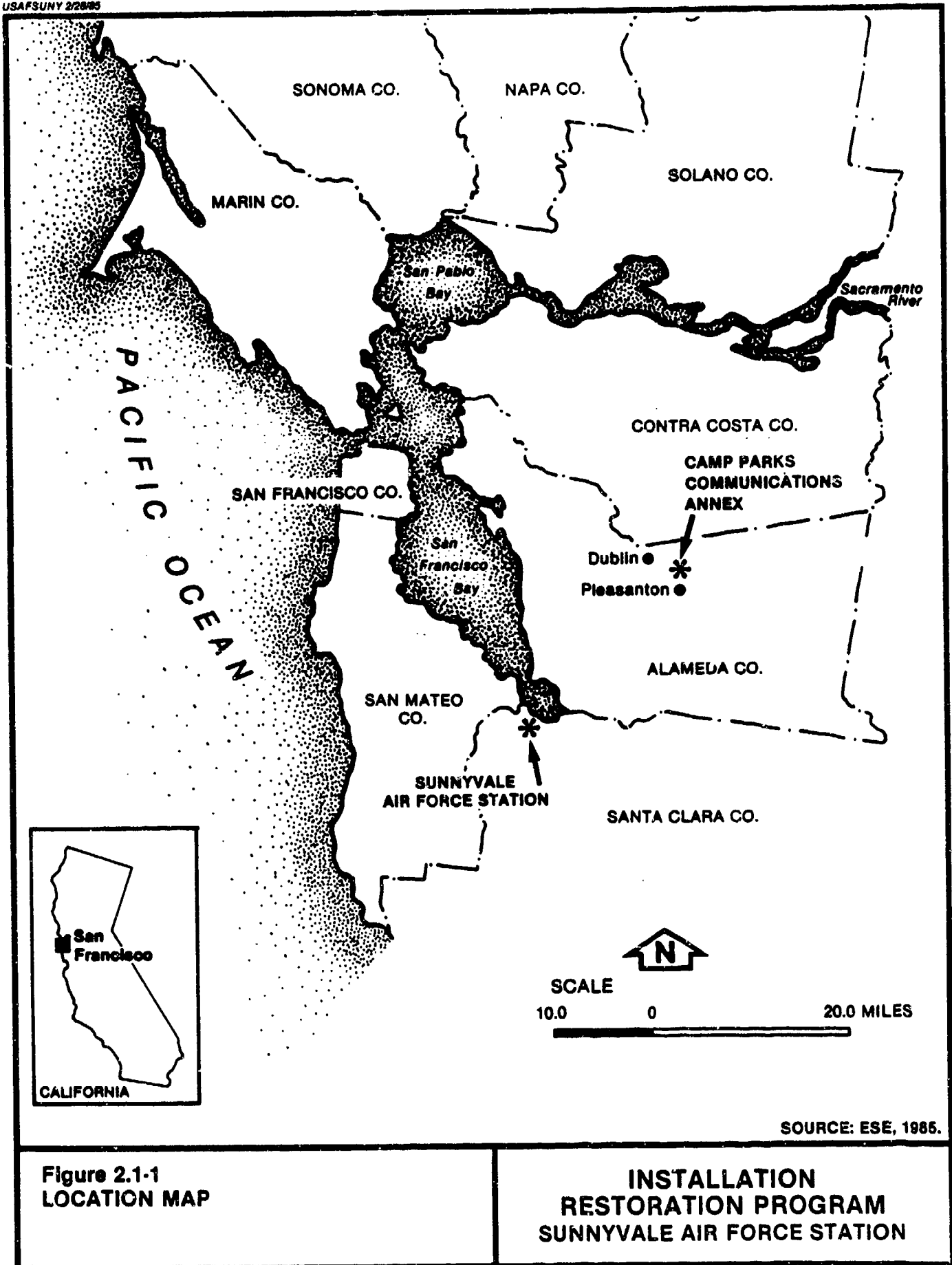
SAFS is situated approximately 40 miles southeast of San Francisco in Santa Clara County, Calif., near the southwest edge of San Francisco Bay (Fig. 2.1-1). SAFS occupies 19.6 acres bounded on the east by Mathilda Ave., on the south by Moffett Drive, and on the west by Lockheed Way (Fig. 2.1-2). The property north and west of SAFS is owned by Prudential Insurance Co. and leased by Lockheed Missile and Space Co. (LMSC). The property south of SAFS is completely developed, and the land east of Mathilda Ave. has been developed for commercial use (AFSCF, 1984a). SAFS housing is located on Naval Air Station (NAS) Moffett Field, approximately 2 miles north of SAFS. SAFS supports a total base population of 3,300, consisting of 1,050 military personnel and 2,250 civilian employees. A photograph of SAFS is presented in App. H.

CPCA is situated approximately 23 miles northeast of SAFS in Alameda County, Calif. (Fig. 2.1-1). CPCA occupies 11.6 acres southeast of Dublin, Calif., and directly north of Pleasanton, Calif. The interchange of Interstate Highways 580 and 680 is immediately southwest of the installation. CPCA is located in an isolated area at the top of a hill. The facility consists of several communication towers and four permanent and three semipermanent buildings (Fig. 2.1-3).

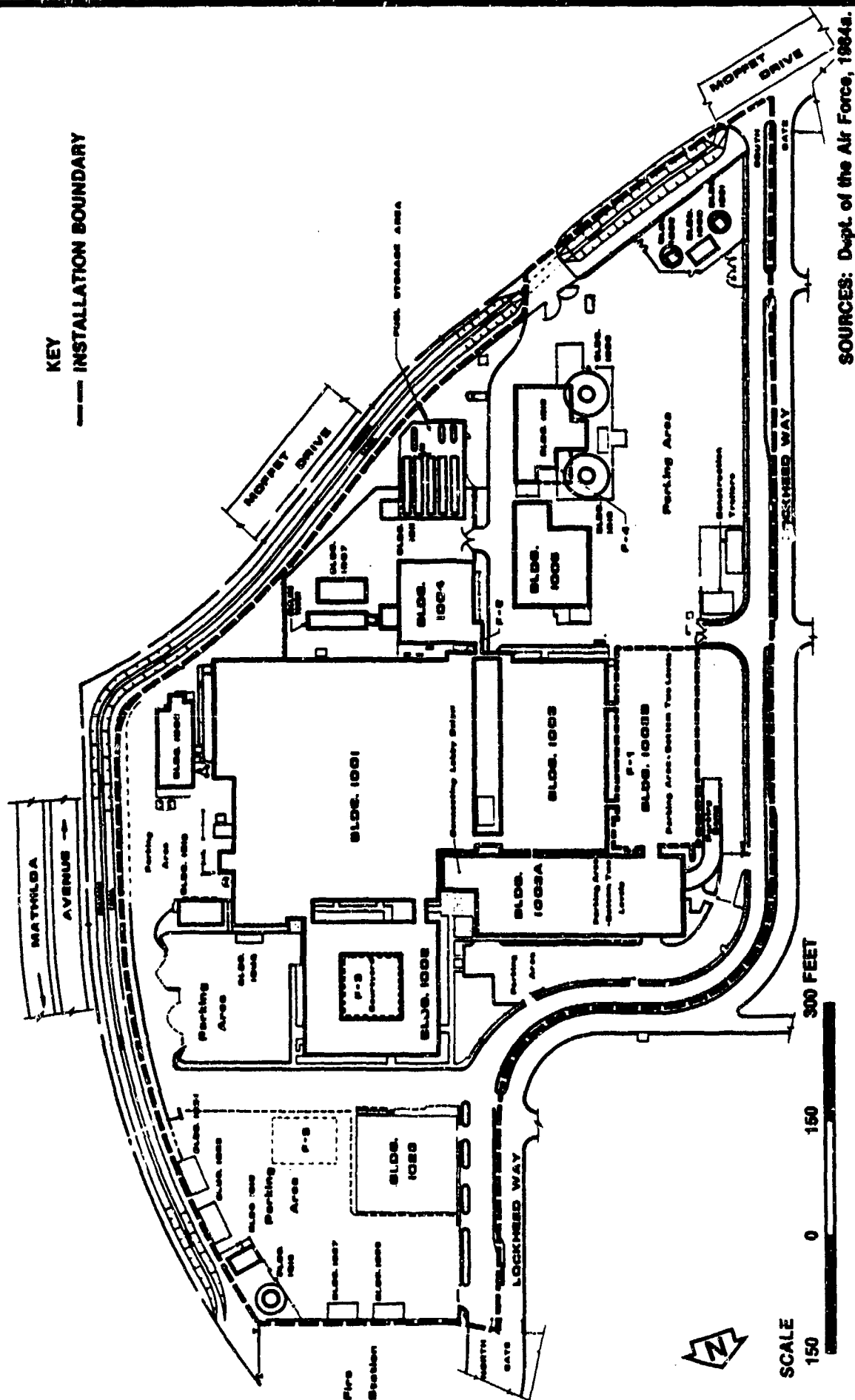
2.2 HISTORY

Sunnyvale AFS

The history of SAFS is summarized in this section. A number of Air Force organizational changes that have affected the command structure of the facility have occurred during its history. A brief chronology of these changes is presented in Table 2.2-1, and additional details associated with these changes are provided in the following paragraphs.



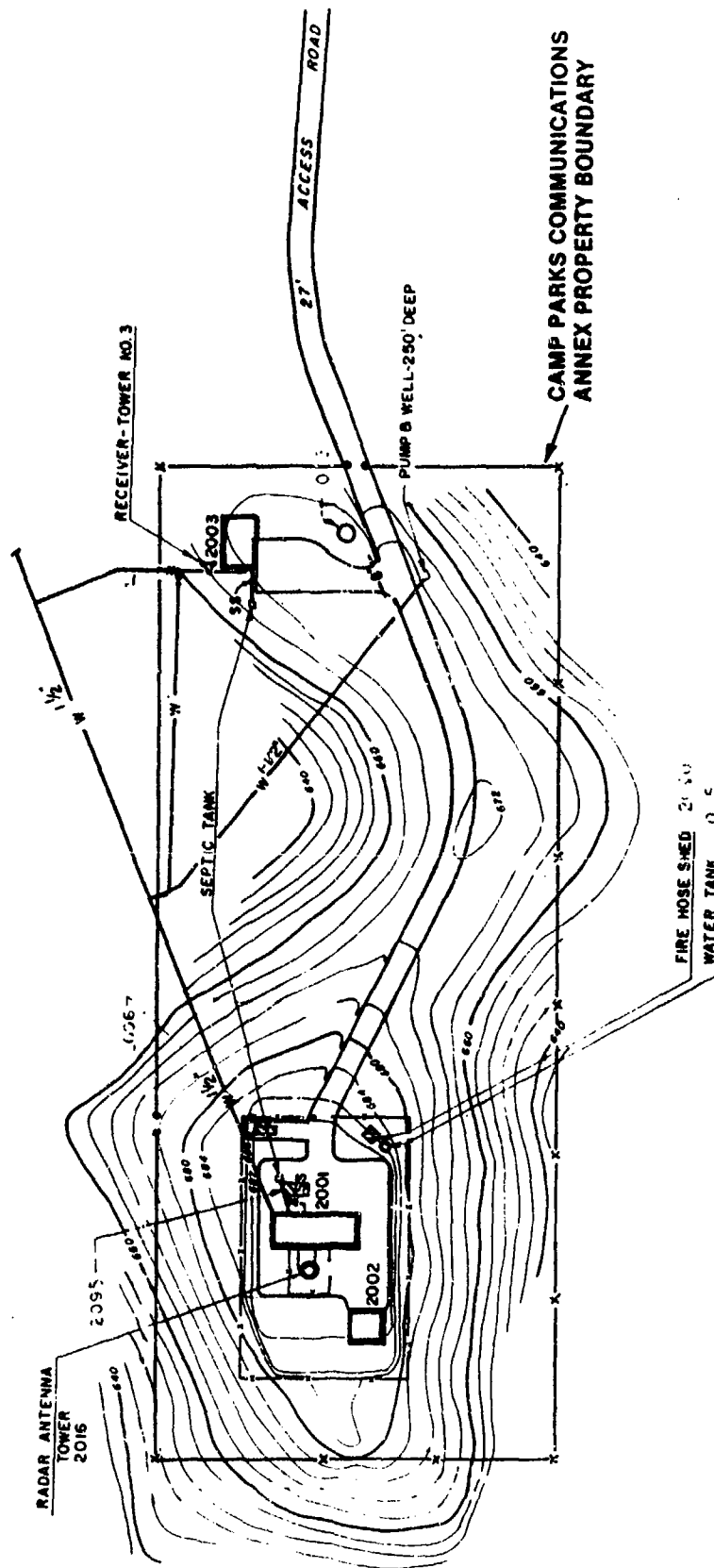
SOURCE: ESE, 1985.



SOURCES: Dept. of the Air Force, 1984a.
ESE, 1985.

INSTALLATION RESTORATION PROGRAM SUNNYVALE AIR FORCE STATION

Figure 2.f-2
SITE MAP OF SUNNYVALE AIR FORCE STATION



SCALE
100 0 100 200 FEET

SOURCES: Dept. of the Air Force, 1984b.
ESE, 1985.

Figure 2.1-3
SITE MAP OF CAMP PARKS COMMUNICATIONS ANNEX

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

Table 2.2-1. Chronology of Historical Events and Organizational Changes for SAFS

| Date | Organization | Event |
|---------------|--|--|
| January 1959 | | Lockheed Missile Systems Division establishes an interim satellite control at Palo Alto |
| Apr. 6, 1959 | HQ Air Research Development Command (ARDC) formed the 6594th Test Wing at the Lockheed Center in Palo Alto | |
| Nov. 11, 1959 | | Air Force purchases 11.4 acres of property in Sunnyvale to establish a Satellite Test Center (STC) |
| Mar. 1, 1960 | | The 6594th Test Wing moved from Palo Alto to the Sunnyvale STC |
| July 7, 1960 | The STC redesignated the Satellite Test Annex (STA) | |
| Nov. 1, 1961 | The 6594th Test Wing redesignated HQ 6594th Aerospace Test Wing | |
| July 1, 1965 | Det. 1, Air Force Satellite Control Facility (AFSCF) was designated and organized with the 6594th Support Group. HQ 6594th Aerospace Test Wing at Sunnyvale was discontinued | |
| 1969 | | Air Force purchases an additional 8.2 acres adjacent to the facility |
| 1970 | | AFSCF assumes responsibility for the Camp Parks Radiometric Test Facility |
| Jan. 1, 1971 | STA redesignated Sunnyvale Air Force Station (SAFS) | |
| July 1, 1977 | HQ AFSCF was reorganized and moved to SAFS; Det. 1, AFSCF was inactivated | |

Sources: AFSCF, 1982.
ESE, 1985.

In January 1959, Lockheed Missile Systems Division completed an interim satellite control center at Palo Alto. During the launch of Discoverer I on Feb. 28, the interim facility received 514 seconds of telemetry from the world's first polar orbiting satellite (AFSCF, 1982).

On April 6, 1959, Headquarters (HQ) Air Research Development Command (ARDC) formed the 6594th Test Wing at the Lockheed Palo Alto location. This was the first U.S. military unit to be charged with military satellite operations (AFSCF, 1982).

In June 1959, the Air Force Ballistic Missile Division (AFBMD) field office was disestablished and its personnel transferred to the 6594th Test Wing. Operational control of the 6593rd Test Squadron (Special) was assigned to the 6594th Test Wing.

By the end of 1959, the Vandenberg, Hawaii, and New Hampshire Tracking Stations and the 6594th Recovery Control Group had joined the 6594th Test Wing. In late 1959, the ARDC was reorganized and decentralized. HQ AFBMD was activated at Los Angeles, Calif., and the 6594th Test Wing at Palo Alto was reassigned from HQ ARDC to HQ AFBMD effective Nov. 15, 1959.

On Nov. 11, 1959, the Air Force purchased 11.4 acres of land in Sunnyvale from the Prudential Insurance Co. This land included Lockheed Bldg. 171 (now Bldg. 1001).

On Jan. 15, 1960, HQ 6594th Test Wing was redesignated as HQ 6594th Test Wing (Satellite). On Mar. 1, the 6594th was moved from Palo Alto to the 11.4-acre site at Sunnyvale, where an interim control center had been established by Lockheed. By the end of June, the Satellite Test Center (STC) was activated to support the Dept. of Defense's emerging space program (AFSCF, 1982).

The STC was redesignated the Satellite Test Annex (STA), under the jurisdiction of AFBMD, on July 7, 1960.

In February 1961, a new satellite control room was built in what is now Bldg. 1001. Lockheed personnel conducted the first multiple satellite operations for two Discoverer satellites on Feb. 17 and 18 in Bldg. 1001 (AFSCF, 1982).

The test wing was redesignated HQ 6594th Aerospace Test Wing on Nov. 1, 1961, with no change in station or assignment.

During the early 1960s, various proposals were considered for expanding the facility. These included adding a second story to Bldg. 1001 to house personnel. In 1961 45,600 square feet were added to Bldg. 1001 for a mechanical equipment room, electrical equipment room, receiving and shipping storage, kitchen, cafeteria, sculler, tape storage processor, printer rooms, and a data records section.

In 1962, construction of Bldg. 1002 added 30,000 square feet (ft²) of administrative support space. Another 4,200 ft² were added to Bldg. 1001 in 1963 to provide space for a communications center, cryptographic equipment room, and another electrical and mechanical room. Additionally, a 1,400-ft² penthouse was built to house chillers and related equipment. A second wing of Bldg. 1002 and another 30,000 ft were completed in 1964.

On July 1, 1965, HQ AFSCF was designated and organized at LAAFS. Det. 1, AFSCF was designated and organized with the 6594th Support Group at Sunnyvale. HQ 6594th Aerospace Test Wing at Sunnyvale was discontinued.

In 1969, USAF purchased an additional 8.2 acres, adjacent to the 11.4 acres purchased in 1960, from Lockheed Aircraft Corp. This purchase increased the acreage of the station to 19.6 acres (SAFS, 1969). Additionally, Bldg. 1003, originally designated and built to support the Manned Orbiting Laboratory, was completed as was Bldg. 1004 which housed the nation's first total energy plant.

In 1970, AFSCF assumed responsibility for the Camp Parks Radiometric Test Facility and accepted the Sunnyvale power plant and Bldg. 1003 from the U.S. Navy (AFSCF, 1982).

The STA was redesignated SAFS on Jan. 1, 1971.

Det. 3, 1901st Communications Squadron (AFSC) was activated at SAFS in July 1975 to operate the Defense Communications Agency (DCA) Satellite Communication (SATCOM) Facility.

HQ AFSCF was reorganized and moved to SAFS on July 1, 1977. Det. 1 of the AFSCF at SAFS was inactivated.

AFSCF operational support increased from 300 contacts and 400 operational hours in 1960 to more than 94,000 contacts and more than 82,000 flight support hours in 1982 (AFSCF, 1982).

Currently, AFSCF consists of seven geographically separated tracking stations in addition to STC, CPCA, and the 6594th Test Group in Hawaii, with recovery forces used for aerial and surface recovery of reentry vehicles (AFSCF, 1984b).

Camp Parks Communications Annex

CPCA is located within an area known as the Parks Reserve Forces Training Area (PRFTA), which is a subinstallation of the U.S. Army's Presidio of San Francisco (PSF). The area now occupied by PRFTA was formerly USAF property known as Parks Air Force Base, which served as an Army Air Corps and, later, an Air Force installation and a U.S. Navy training center from 1942 to 1959. In 1959, control of the installation was transferred from USAF to the Army as a subinstallation of PSF (Secretary of the Army, 1972). From 1959 to 1964, PRFTA was held in standby status under jurisdiction of the 6th U.S. Army. In 1964, much of the installation's land was declared excess and transferred to Federal or local public agencies. In 1975, the Army began using PRFTA as a reserve component training site and mobilization station.

The 11.6 acres that comprise CPCA have been operated as a radiometric test facility since 1961. In 1961, the portion of the annex known as Area A was developed and operated by the Massachusetts Institute of Technology (MIT). In 1972, facilities on Area B were constructed. MIT operated the facility from 1961 to 1970, and Lockheed Aircraft Corp. has been the operating contractor since 1970. In 1970, AFSCF assumed responsibility for the Camp Parks Radiometric Test Facility, and in 1972 the facilities and land were officially transferred from the Army to the Air Force (Secretary of the Army, 1972). The facility was redesignated CPCA in 1975, and AFSCF Operating Location (OL) AB was activated to operate the facility.

2.3 MISSION AND ORGANIZATION

The AFSCF is headquartered at SAFS. The primary mission of AFSCF is to acquire, maintain, and operate a common-user spacecraft support network for DOD (AFSCF, 1984b). AFSCF provides capability for simultaneous command and control of large numbers of military spacecraft through its worldwide network of satellite tracking and commanding stations. Tracking stations have been strategically located to (1) support equatorial launches from the Eastern Space and Missile Center, (2) support polar launches from the Western Space and Missile Center, (3) continuously support satellites in a variety of orbiters, and (4) support low-altitude satellites during their daily earth revolutions.

The following units and contractors are located at SAFS (AFSC, 1984):

Primary Organizations

HQ AFSCF

6594th Air Base Squadron

Tenants

1999th Communications Squadron

AFSC Liaison Office

HQ SD/OL-AI

Satellite Control Division/OL-A

Contractors

Aerospace Corp.
AMEX Systems, Inc.
Control Data Corp.
Ford Aerospace and Communications Corp.
LMSC
Martin Marietta Aerospace
Mellonics Systems Development
RCA Corp.
Rockwell International
System Development Corp.
Sperry Corp.

Organizations, missions, and tenant activities are described in App. D.

3.0 ENVIRONMENTAL SETTING

This section describes the environmental conditions at SAFS and CPCA, including specific site data for meteorology, geology, soils, surface hydrology, geohydrology, and biota. These data subsequently are used in the HARM scoring system to numerically assess the pollutant transport mechanisms and potential receptors present at the site. App. G describes the factors used in the HARM system.

3.1 METEOROLOGY

Climatological data for SAFS are summarized in Table 3.1-1. These data were collected at the NAS Moffett Field meteorological station, which is located approximately 2 miles north of SAFS. The period of record for the data is 31 years (1945 to 1976).

SAFS has a mild, Mediterranean-type climate, with temperatures moderated by San Francisco Bay. The daily temperature range is small. The average monthly temperature ranges from a low of 48.0°F in January to a high of 65.5°F in July. The annual average temperature is 57.6°F.

The area is characterized by dry summers and wet winters. Mean annual rainfall for the area is 12.99 inches, 83 percent of which occurs from November through March at an average rate of approximately 2.2 inches per month. In contrast, the summer (April to October) is dry, with rainfall rates ranging from 0.02 to 0.95 inch per month. During summer, rainfall occurs at an average rate of 0.32 inch per month.

Climatological data (Table 3.1-2) for CPCA were obtained from the National Oceanic and Atmospheric Administration meteorological station at Livermore, Calif., located approximately 6 miles southeast of CPCA. The period of record for the data is 29 years (1951-1980). The climate of CPCA is mild, with average monthly temperatures ranging from a low of

Table 3.1-1. Climatological Data for SAFS

| Month | Temperature (°F) | Precipitation (inches) |
|------------------|---------------------|---------------------------|
| January | 48.0 | 2.75 |
| February | 51.5 | 1.87 |
| March | 53.0 | 1.77 |
| April | 56.0 | 0.95 |
| May | 59.0 | 0.38 |
| June | 63.5 | 0.08 |
| July | 64.5 | 0.02 |
| August | 65.5 | 0.02 |
| September | 65.0 | 0.16 |
| October | 61.0 | 0.65 |
| November | 55.0 | 1.77 |
| December | 49.5 | 2.57 |
| Annual | 57.6 | 12.99 |
| Period of Record | 1945-1976 | 1945-1976 |

Note: Data are for NAS Moffett Field; Santa Clara Co.; elevation = 15 ft above mean sea level (MSL).

Sources: Det. 3, HQ Air Weather Service, 1976.
ESE, 1985.

Table 3.1-2. Climatological Data for CPCA

| Month | Temperature (°F) | Precipitation (inches) |
|------------------|---------------------|---------------------------|
| January | 45.9 | 3.04 |
| February | 49.6 | 2.19 |
| March | 51.7 | 1.81 |
| April | 55.8 | 1.28 |
| May | 61.3 | 0.38 |
| June | 67.1 | 0.11 |
| July | 71.3 | 0.04 |
| August | 70.9 | 0.07 |
| September | 69.0 | 0.18 |
| October | 62.2 | 0.67 |
| November | 52.8 | 1.77 |
| December | 46.5 | 2.57 |
| Annual | 58.7 | 14.11 |
| Period of Record | 1951-1980 | 1951-1980 |

Note: Data are for Livermore, Calif.; Station Index No. 4997; Alameda Co.; 37°47'N 121°46'W; elevation = 480 ft above MSL.

Sources: National Climatic Data Center, 1983.
ESE, 1985.

45.9°F in January to a high of 71.3°F in July. The average annual temperature is 58.7°F. The area is characterized by wet winters and dry summers. Approximately 81 percent of 14.11 inches of annual rainfall occurs from November through March (Table 3.1-2).

The pathways category of the HARM scoring system includes surface water migration, flooding, and ground water migration routes. Numerical evaluation of these routes involves factors associated with the particular migration route (see App. G). Two meteorological factors used in this evaluation are net precipitation and the 1-year, 24-hour rainfall event. Mean annual evaporation for SAFS is 42 inches per year (U.S. Dept. of Commerce, 1968); therefore, net precipitation, which is the difference between annual precipitation and evaporation, is -29.01 inches per year. The 1-year, 24-hour rainfall event is 3 inches (U.S. Dept. of Commerce, 1961). The low value for net precipitation indicates a low potential for significant infiltration or the formation of permanent surface water features. The 1-year, 24-hour rainfall event of 3 inches indicates a moderate potential for runoff and erosion. Most of the installation, however, is asphalt-paved and contains stormwater drainage systems to control runoff, thus eliminating any potential for significant flooding and soil erosion.

Net precipitation at CPCA is -29.90 inches per year, and the 1-year, 24-hour rainfall event is 2 inches (U.S. Dept. of Commerce, 1960, 1961).

3.2 GEOGRAPHY

3.2.1 PHYSIOGRAPHY

Due to its small size, most of SAFS consists of buildings and asphalt-paved parking areas (Fig. 2.1-2). Several areas (e.g., the courtyard) of the facility contain natural soils that are used for ornamental landscaping. The station is situated in an area of light industrial use, dominated by aerospace and electronics industries. Residential housing is located approximately 1,000 ft southeast of the installation. The installation is nearly level at approximately 19 to 25 ft above mean sea level (MSL) (SAFS-24a).

CPCA is located at the top of a hill and consists of two areas with radar towers, small buildings, and adjacent asphalt-paved parking (Fig. 2.1-3). Bldgs. 2001 and 2002 are situated at 692 ft above MSL, and Bldg. 2003 is at 668 ft above MSL. Due to its location on a hilltop, elevations decrease in all directions to approximately 640 ft above MSL at the boundary of CPCA. The topographic gradient from Bldg. 2002 to the western boundary of CPCA is approximately -1 ft per 5 ft.

3.2.2 SURFACE HYDROLOGY

Stormwater drainage from rooftops and parking areas on SAFS is transmitted off the station through a system of catch basins and 6- to 36-inch-diameter underground concrete pipes (Fig. 3.2-1). Most of the runoff drains into a small canal that borders the southern and eastern edges of the installation. This canal empties into Guadalupe Slough, which drains into San Francisco Bay. The western edge of the station drains into a 36-inch storm drain located along Lockheed Way. Because most of SAFS consists of buildings or paved parking areas, all rainfall drains off the station as stormwater runoff. Very little infiltration of rainfall is expected to occur on the installation.

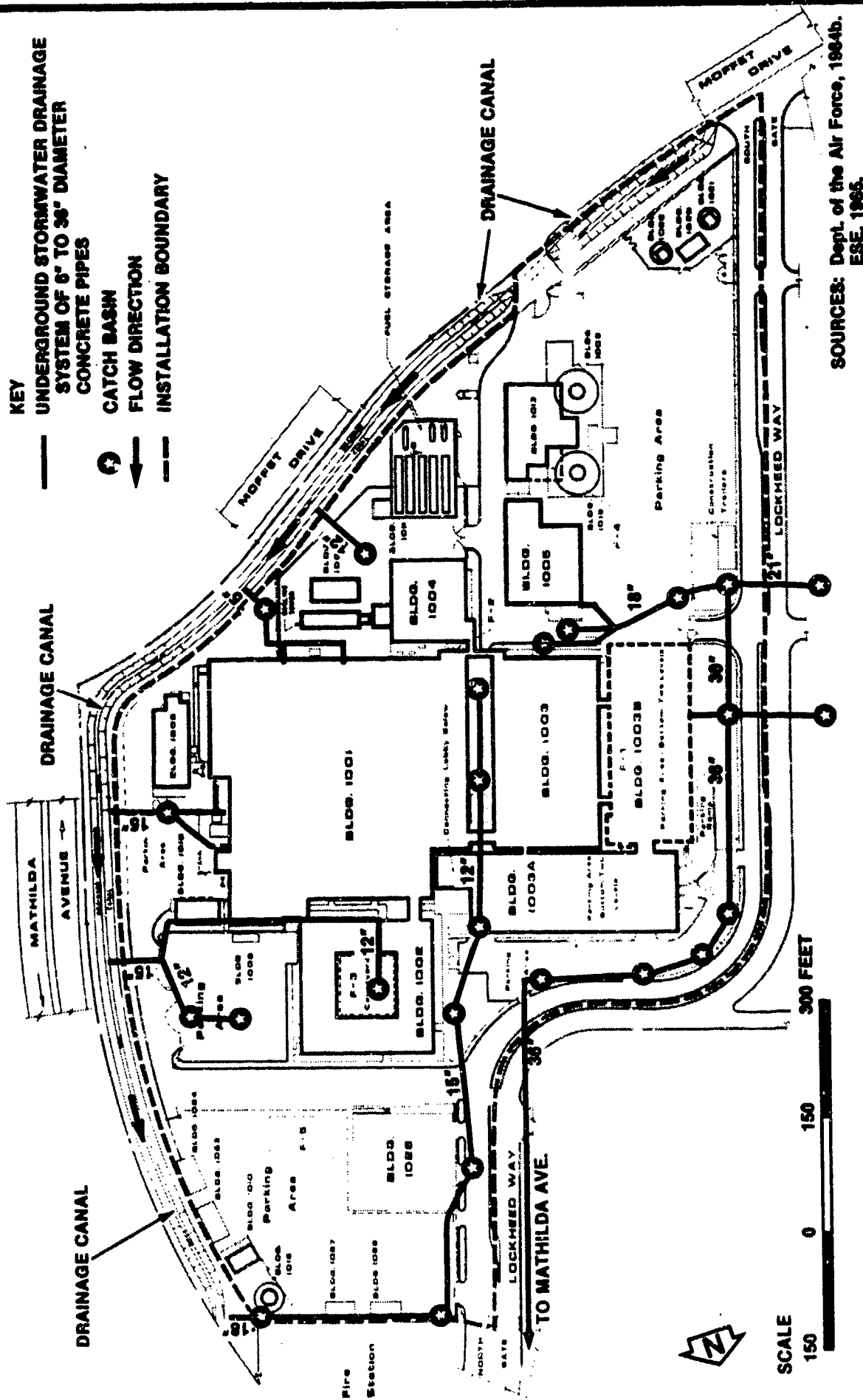
Stormwater runoff on CPCA is directed through a surface drainage system of open ditches and swales. Due to its location on a hilltop, stormwater drainage is not a problem. The annex is located in the drainage basin of Tassajara Creek, which flows in a southerly direction approximately 0.5 mile east of the installation.

3.3 GEOLOGY

3.3.1 GEOLOGIC SETTING

Sunnyvale AFS

SAFS is situated in the northern Santa Clara Valley on alluvial deposits of the San Jose Plain. The Santa Clara Valley is a large structural depression created by tectonic movement of the San Andreas Fault to the west and the Hayward Fault to the east (Canonie Environmental Services,



SOURCES: Dept. of the Air Force, 1984b.
ESE, 1985.

**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**

**Figure 3.2-1
STORMWATER DRAINAGE SYSTEM ON SAFS**

1983). The valley is partially filled with alluvial sediments weathering from the Santa Cruz Mountains to the west and the Diablo Mountains to the east (see Fig. 3.3-1).

The Pleistocene Santa Clara Formation underlies Recent alluvium deposits within the basin. The Santa Clara Formation consists of nonmarine conglomerates, sandstones, siltstones, and clays. Underlying this formation, various marine sedimentary and volcanic units overlie the basement Franciscan Formation. A generalized geologic section for the SAFS vicinity is presented in Table 3.3-1.

The upper sections of the Santa Clara Formation consist of mixtures of gravel, sand, silt, and clay. Distribution of these sediments depended on ancient river deposition with finer material deposited further downslope away from the source area. The maximum depth of alluvial deposits has been estimated to be in excess of 1,500 ft in the valley floor (Canonie Environmental Services, 1983). Younger fan deposits on the west side of the valley interfinger with shallow marine sediments from San Francisco Bay. Lithologic logs adjacent to NAS Moffett Field reveal multiple sand and gravel units separated by silt or clay units. The surficial geologic units have been mapped as interfluvial basin deposits of Recent age (see Fig. 3.3-2). Soil borings on SAFS (see Fig. 3.3-3) exhibit alternating units of sandy silt, silty clay, and sandy gravel, typical of both alluvial and shallow marine deposition.

Structurally, one fault has been postulated in the vicinity of SAFS (Canonie Environmental Services, 1983). This fault is a normal, dip slip type, located just west of the installation near the intersection of Routes 101 and 237. The extent and depth of subsurface movement along this fault is unknown. No surficial, vertical displacement is visible in the fault zone.

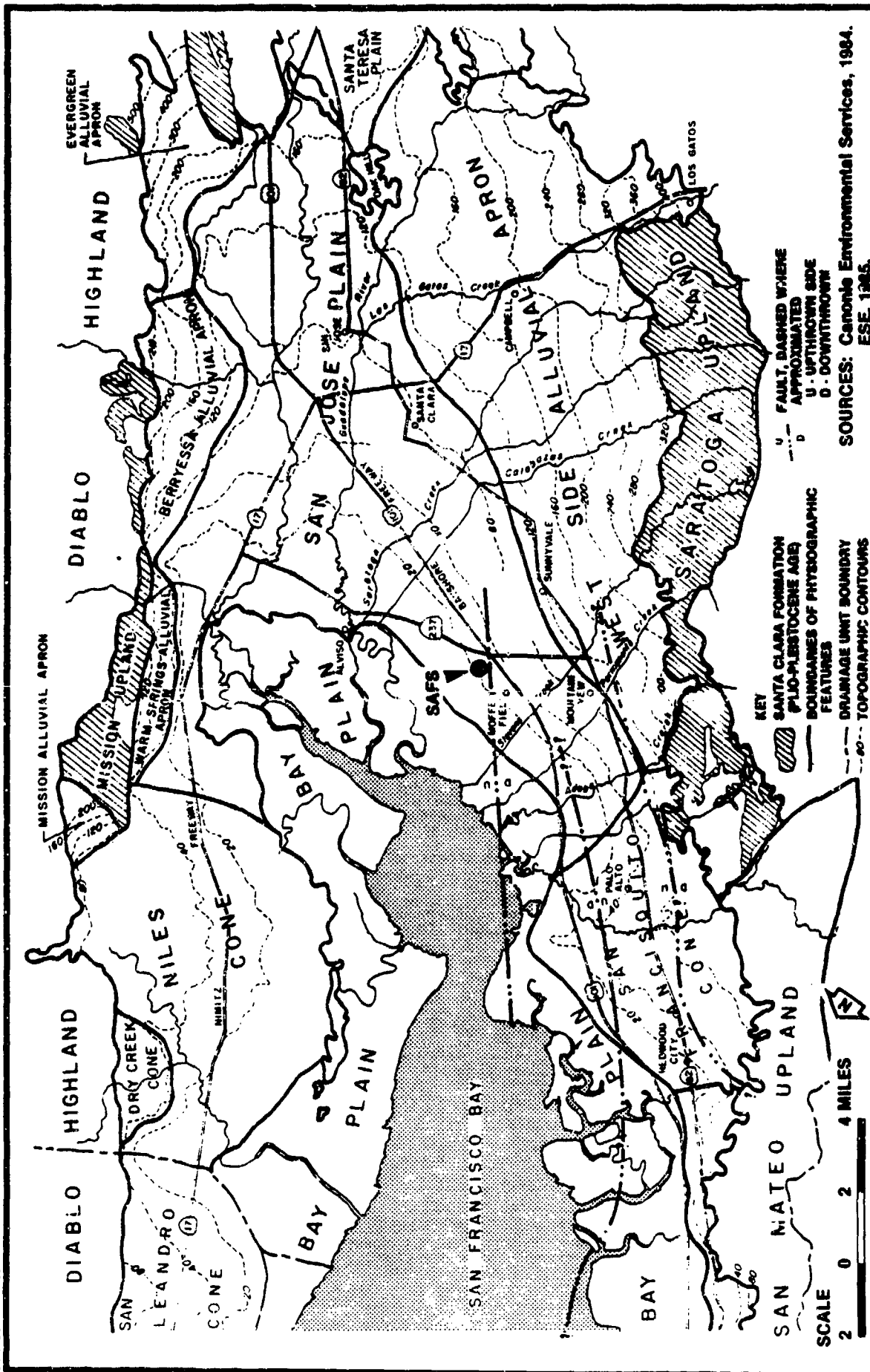


Figure 3.3-1
REGIONAL GEOLOGIC FEATURES IN VICINITY OF SAFS

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

Table 3.3-1. Generalized Geologic Section in Vicinity of SAFS

| System | | Geologic Units | Informal Unit Name | Lithologic Character |
|------------|-------------|---|-------------------------|---|
| Quaternary | Recent | Surficial sediments | Alluvium (Qb and Qal) | Stream-laid gravel, sand, and silt. |
| | | | Bay mud and clay (Qobm) | Brackish marine-gray to nearly black, commonly alkaline in places, with small molluscan fossils. |
| | Pleistocene | Older Alluvium | Alluvium | Stream-laid gravel composed of cobbles and pebbles in a matrix of light-brown to reddish-brown sand and silt derived from adjacent hills. Generally unformed; dissected where elevated; thickness unknown. |
| | | Santa Clara Formation | | Terrestrial sedimentary rocks, weakly consolidated; consisting of stream-laid conglomerate and interbedded soft gritty sandstone, siltstone, and clay; as well as lacustrine clay and sandstone at the base of the section. Northeast of the San Andreas Fault, the formation rests with profound unconformity on the Franciscan Formation and other Tertiary formations. |
| Tertiary | Pliocene | <u>Unconformity</u> Merced Formation | | Soft-yellow fine to medium-grained sandstone with abundant shallow marine molluscan fossils less than 150 ft thick. |
| | Miocene | <u>Unconformity</u> Monterey Shale | | Marine semisiliceous shale. |

Table 3.3-1. Generalized Geologic Section in Vicinity of SAFS
(Continued, Page 2 of 2)

| System | Geologic Units | Informal Unit Name | Lithologic Character |
|-------------------------|----------------------------|-----------------------|---|
| Tertiary (Continued) | Miocene (Continued) | Unnamed sandstone | Marine, light-gray massive to poorly bedded soft, mostly fine sandstone, in places contains concretions. |
| | | Page Mill Basalt | Extrusive basalt, black, hard, very fine, composed mainly of calcic plagioclase, pyroxene, and iron oxides. |
| | | Mindego Basalt | Extrusive basalt submarine flows, flow breccias, agglomerates, and tuff breccias. |
| | Oligocene and (or) Miocene | Basalt and Diabase | Basalt and diabase black, massive forms isolated flows and or sills in San Lorenzo Formation and Lambert shale. |
| | | Lambert shale | Marine shale. |
| | | Vaqueros sandstone | Marine sandstone, light-gray semifriable to hard, bedded to massive. |
| | | San Lorenzo Formation | Marine sedimentary rocks, mostly clay, shale, and siltstone. |
| | Eocene | Butano sandstone | Marine sedimentary rocks, mostly clay, shale, and siltstone. |
| | | Franciscan Formation | Sequence of volcanic and unmetamorphosed marine sedimentary rocks; brecciated or sheared in places. |
| | Cretaceous | | |

Sources: Naval Energy and Environmental Support Activity (NEESA), 1984.
ESE, 1985.

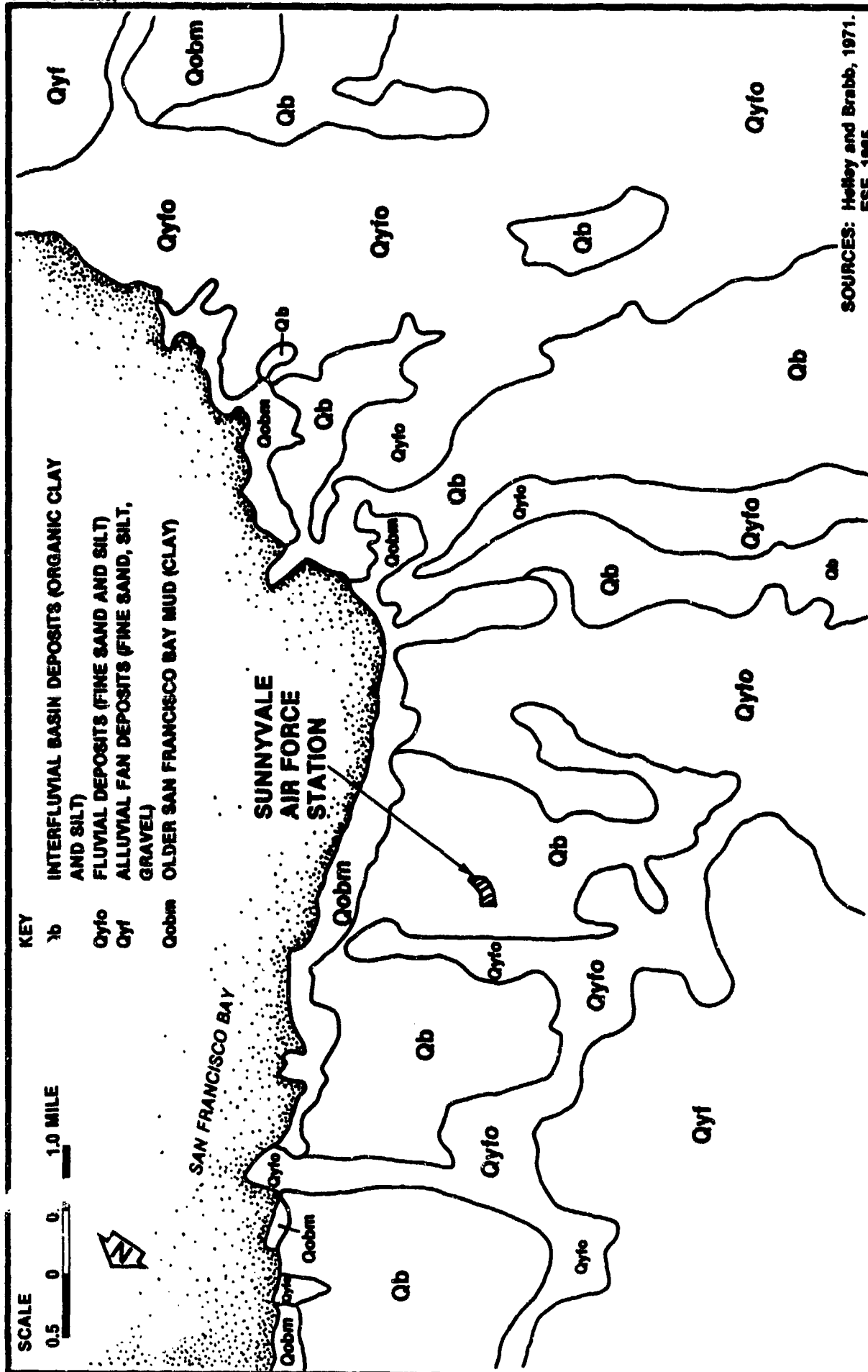
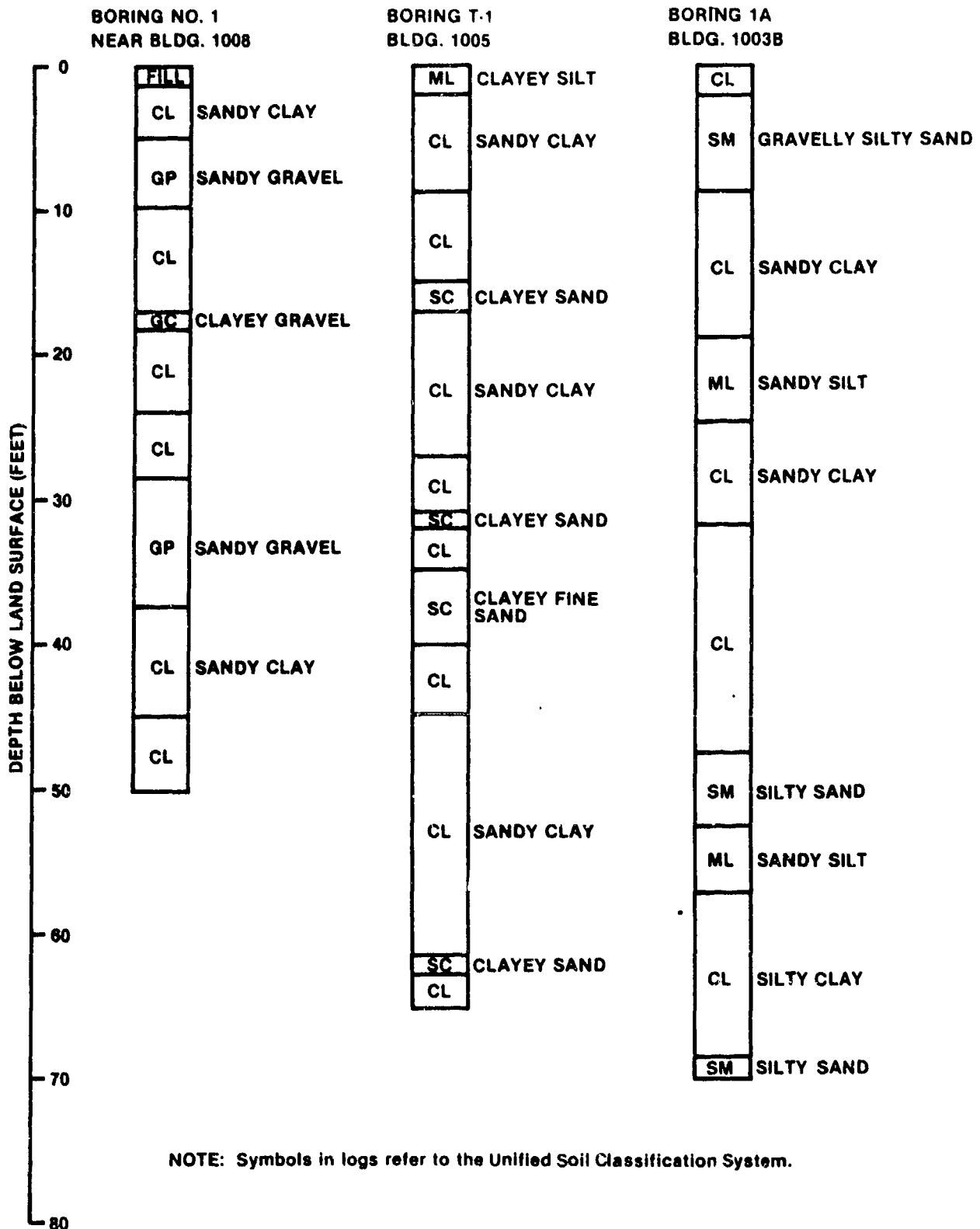


Figure 3.3-2
SURFICIAL GEOLOGY IN VICINITY OF SAFS

**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**



**Figure 3.3-3
TYPICAL LITHOLOGIC SOIL PROFILES
AT SAFS**

**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**

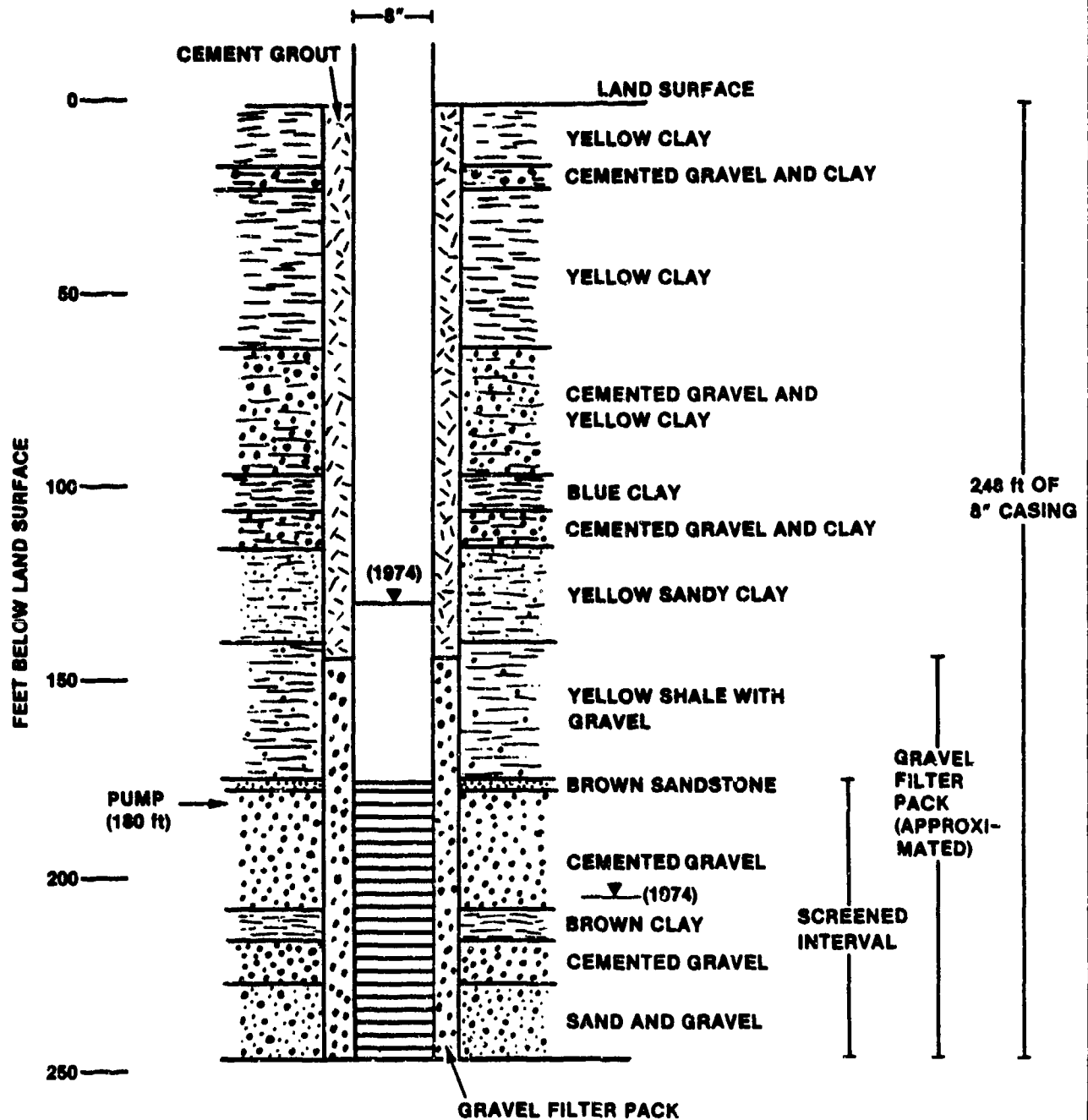
Camp Parks Communications Annex

CPCA is located in Amador Valley, the western portion of Livermore Valley. The Livermore Valley is the most prominent valley within the Hamilton-Mt. Diablo Range of central California. The valley is bounded on the west by the Pleasanton Ridge and on the east by the Altamont Hills. The Pleasanton Ridge and the Altamont Hills consist of Jurassic to Cretaceous sedimentary rocks known as the Great Valley Sequence and are bounded on the foothills by Tertiary sedimentary rocks (U.S. Army Corps of Engineers, 1981). The Livermore Valley is composed of a downwarped and faulted sequence of Miocene to Pliocene sandstones and conglomerates. The syncline defining the valley is oriented approximately east-west (U.S. Army Corps of Engineers, 1981). CPCA is underlain by the Pliocene Tassajara Formation, consisting of bedded deposits of sandstone, buffaceous sandstone, and shale. The underlying units at CPCA are shown in Fig. 3.3-4. This profile was constructed from the log of the CPCA water supply well. As shown, layers of clay, cemented gravel, shale, and sandstone underlie CPCA. CPCA is located in a seismically active region, with the Pleasanton Fault suspected approximately 2.5 miles west of the annex. This fault is potentially active if it does exist. Positive identification of the fault zone is unavailable based on currently available information (U.S. Army Corps of Engineers, 1981).

3.3.2 SOILS

Sunnyvale, CA

The U.S. Soil Conservation Service (SCS) (1967, 1968) has mapped and identified the regional soil types near SAFS. SAFS is located within the Sunnyvale-Castro Association (see Fig. 3.3-5). The association consists of poorly drained, fine-textured soils developed on fine, noncalcareous alluvium. This soil type occupies nearly level, low positions of interfluvial basin deposits. The soils exhibit low permeability and a high water table. The Sunnyvale soils have calcareous, gray silty clay subsoils. Castro soils have dark gray, calcareous clay surface layers and gray, partially calcareous cemented



SOURCES: SAFS, 1985.
ESE, 1985.

Figure 3.3-4
GEOLOGIC LOG AND WELL
CONSTRUCTION FOR CPCA
WATER SUPPLY WELL

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

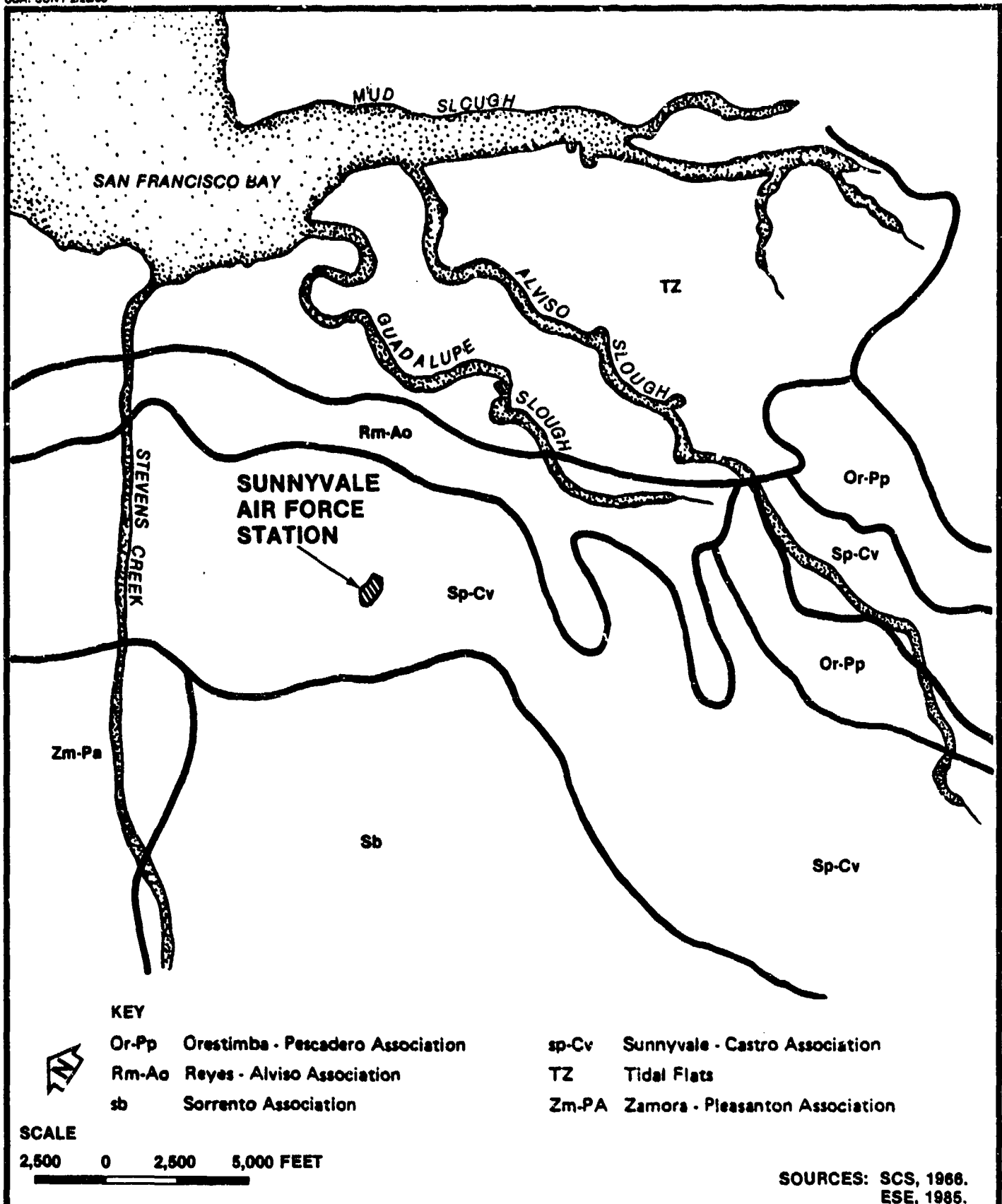


Figure 3.3-5
GENERAL SOIL TYPES IN VICINITY
OF SAFS

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

clay subsoils. Shallow and deep soil lithologies from soil boring data (Fig. 3.3-3) consist of alternating units of sandy silt, silty clay, and sandy gravel typical of alluvial and shallow marine deposition. Slopes encountered in the Sunnyvale-Castro Association are usually very low, ranging from 0 to 1 percent. Surface runoff is very slow, and the erosion hazard is extremely low.

Camp Parks Communications Annex

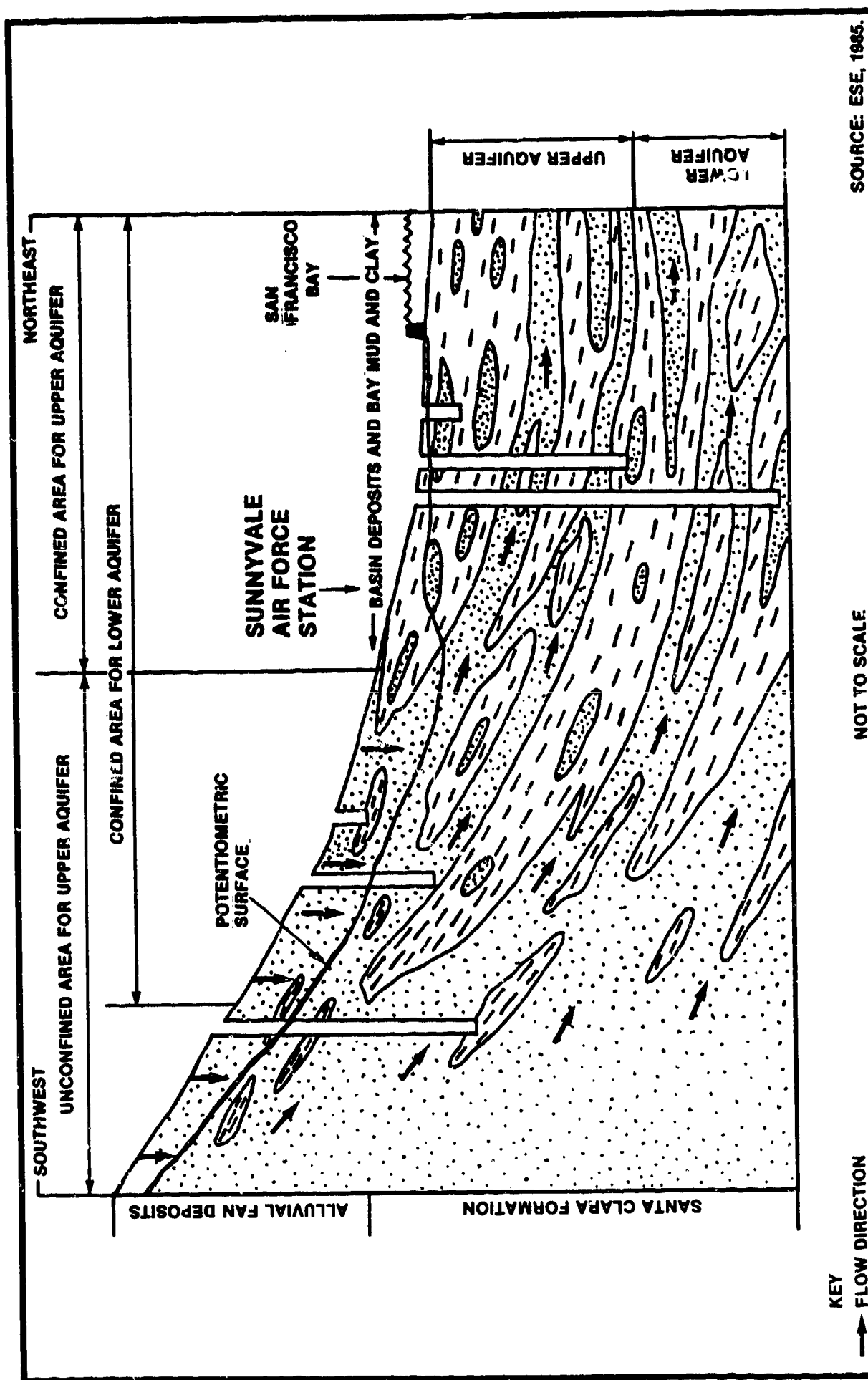
Soil units overlying the Tassajara Formation are classified within the Diablo series. The Diablo clay on CPCA has slopes ranging from 9 to 30 percent and are characterized by a high shrink-swell potential and permeability ranging from 0.6 to 2.0 inches per hour. The runoff rate is slow to medium, and the hazard of erosion is light to moderate where soil is exposed (U.S. Army Corps of Engineers, 1981).

3.3.3 HYDROGEOLOGY

Sunnyvale AFS

Aquifers underlying SAFS consist of sand and gravel stream deposits interlayered with less permeable silt and clay aquicludes. The coarser and more permeable deposits occur closer to the Santa Cruz Mountains, south of SAFS. The alluvium becomes finer grained and less permeable in the vicinity of San Francisco Bay. The fine nature of the alluvium results from the reduced bed load capacity of the streams as their velocities decrease near San Francisco Bay. These sediments are mixed and interfingered with Pleistocene marine deposits associated with San Francisco Bay (Canonie Environmental Services, 1983).

Two major aquifer systems are encountered in the vicinity of SAFS. The lower aquifer system occurs at a depth of approximately 200 ft (see Fig. 3.3-6). This aquifer consists of sand and gravel overlain by a confining unit approximately 100 ft thick, consisting of silty clay and clayey silt (Canonie Environmental Services, 1983). The potentiometric surface in this confined aquifer is approximately 100 ft below land surface. Recharge to the confined aquifer in the lower aquifer zone is



**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**

**Figure 3.3-6
GENERALIZED GEOLOGIC AND HYDROGEOLOGIC SECTION
IN THE VICINITY OF SAFS**

from leakage of water from the shallow unconfined aquifer. Recharge also occurs from precipitation, stream flow, and excess irrigation on the upgradient alluvial fans (NEESA, 1984).

Above this thick confining unit, an upper aquifer system occurs between ground surface and a maximum depth of about 100 ft (see Fig. 3.3-6). Confining units within the upper aquifer may be discontinuous, and the aquifer is characterized by both confined and unconfined sections. Recharge to the upper aquifer occurs by surface infiltration and local stream flow. Locally perched and semiperched ground water is known to occur in the upper zone sands overlying localized clay lenses. These aquifers are usually within the top 20 ft of the unconsolidated deposits. Aquifer performance tests at different depths in the upper aquifer show that these localized aquifers are hydraulically connected.

The potentiometric surface for the upper aquifer generally conforms to the topographic gradient. At SAFS, ground water in the shallow aquifer flows in a northerly direction toward San Francisco Bay (see Fig. 3.3-7). The potentiometric map represents ground water elevation contours in a specific subsurface aquifer. In each aquifer, flow is perpendicular to the contours from areas of higher elevation (ft MSL) to areas of lower elevation as indicated by the flow direction arrows. The upper aquifer and lower aquifer are not in hydraulic connection due to the continuous, low-permeable confining unit. Well clusters in the upper aquifer have shown a vertical gradient downward (Canonie Environmental Services, 1983). Recharge to the unconfined and confined sections of the upper aquifer occurs primarily through percolation of rainfall and streamflow. Lateral ground water movement in the upper and lower aquifers would be in the range of 100 ft per year maximum, based on a study performed near SAFS by Canonie Environmental Services (1983). Migration of any contaminant entering the ground water system would be in a northerly direction with some downward flow component.

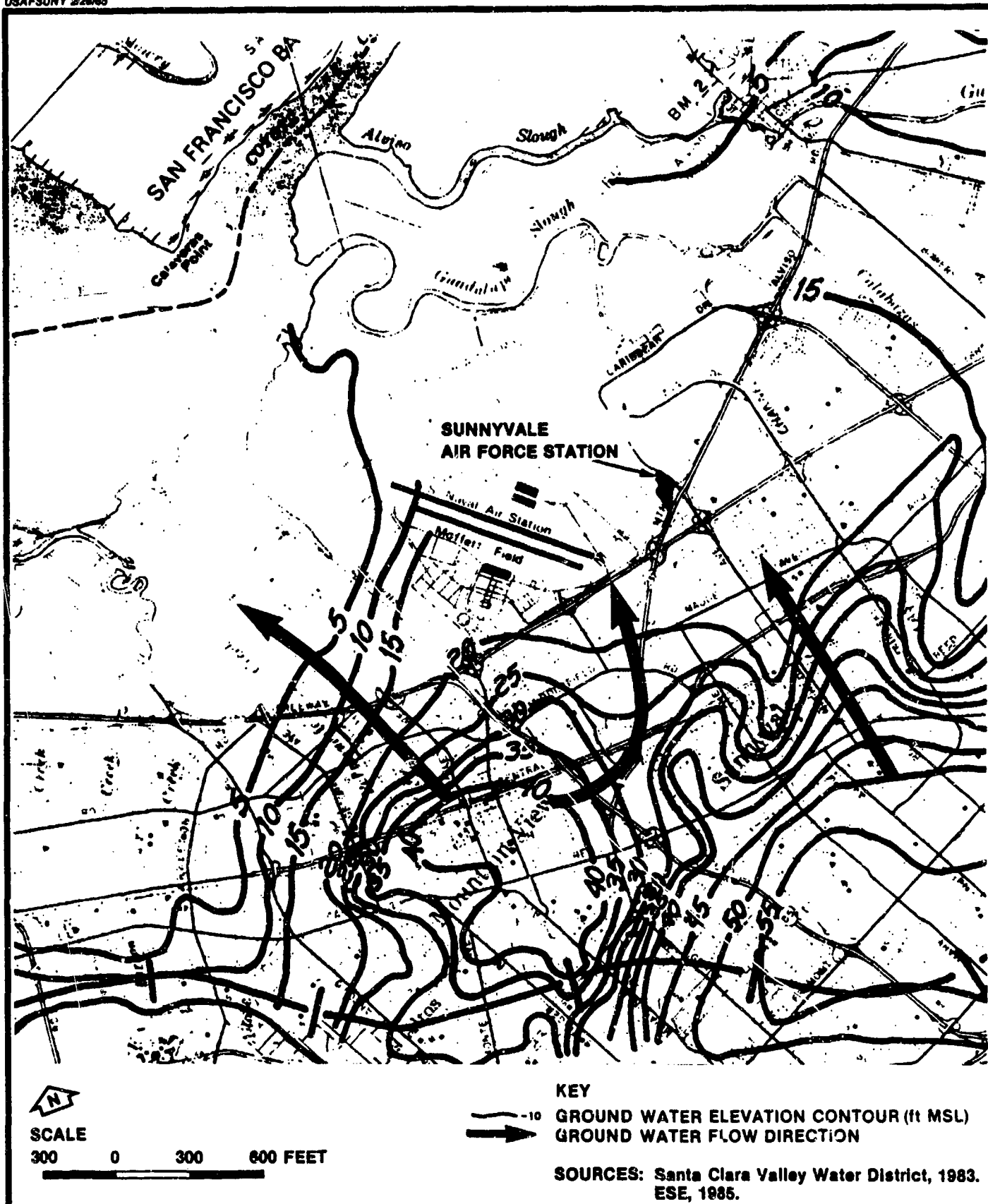


Figure 3.3-7
POTENTIOMETRIC SURFACE (ft MSL)
OF THE UPPER AQUIFER IN VICINITY
OF SAFS

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

Saltwater intrusion has occurred in the upper aquifer adjacent to San Francisco Bay from heavy pumping in the aquifer. In the vicinity of SAFS, chloride concentrations range from less than 100 milligrams per liter (mg/l) to greater than 5,000 mg/l north of the installation (NEESA, 1984).

SAFS has no potable wells located on the installation. All potable and industrial water is supplied by municipal sources. The installation has one monitor well located immediately west of Bldg. 1007. The well was installed in October 1983 to monitor water quality in the vicinity of the fuel storage area. The well has a total depth of 22.4 ft and is cased with 2-inch polyvinyl chloride (PVC) pipe.

Camp Parks Communications Annex

CPCA is underlain by the Camp subbasin, a portion of the Livermore Valley Ground Water Basin. The subbasin covers an area of 2,858 acres and is drained by Tassajara Creek and Cottonwood Creek. The subbasin is bounded on the west by the Pleasanton Fault and on the east by steeply dipping units, which make the basin hydraulically separate from adjacent ground water basins. Well yields are relatively low in the Camp subbasin due to the presence of shale units with low permeability. Recharge to the aquifer system occurs through infiltration of precipitation within the outcrop areas.

CPCA has one water well within the annex boundaries. The well was installed in 1974 to a depth of 248 ft. The well was originally used for potable water supply purposes. Currently, it is used for sanitary and supply purposes, and bottled water, supplied in a water cooling unit, is used for potable uses due to its convenience. No water quality data were available from CPCA, SAFS, or Oaknoll Naval Hospital on the well-water quality. Well construction details are presented in Fig. 3.3-4.

Before 1974, potable water was obtained through PRFTA. PRFTA operates a well field approximately 2 miles south of CPCA. The well field consists of four wells, with three wells actively pumping.

3.4 WATER QUALITY

3.4.1 SURFACE WATER QUALITY

Sunnyvale AFS

There are no surface water features on SAFS. A small drainage canal borders the southern and eastern boundaries of the installation (Fig. 3.2-1) and receives stormwater runoff along Mathilda Ave. and Moffett Drive. Consequently, the canal has intermittent flow, depending on rainfall. This canal empties into Guadalupe Slough, which drains into San Francisco Bay.

Surface water quality data are available for stations along Guadalupe Slough and Coyote Creek, located approximately 2 miles north of SAFS. These data were collected by the State of California Dept. of Water Resources and were obtained from the EPA Storage and Retrieval (STORET) water quality data base. The data are summarized in Table 3.4-1.

As shown, the creeks exhibit high conductivity values indicative of high dissolved solids, presumable due to sodium chloride. This reflects the brackish nature of these aquatic systems and their interface between freshwater streams and the saline water of San Francisco Bay. The data also indicate relatively high levels of inorganic nutrients. For example, inorganic nitrogen (ammonia plus nitrate) and inorganic phosphorus (orthophosphorus) comprise 80 to 90 percent of the total nitrogen and total phosphorus in the systems. This likely reflects runoff of fertilizers from the predominantly urban areas that drain into these creeks. Dissolved oxygen levels and pH values shown in Table 3.4-1 are typical for estuarine systems.

Table 3.4-1. Summary of Water Quality Data for Streams in the Vicinity of SAFS

| Parameter | Guadalupe Slough at Moffett Channel | Guadalupe Slough at NAS Moffett Field | Coyote Creek Estuary off Guadalupe Slough | Coyote Creek Near SAFS |
|--------------------------|-------------------------------------|---------------------------------------|---|------------------------|
| Sampling Date | 6/19/75 | 6/19/75 | 6/18-19/75 | 6/18-19/75 |
| pH (std. units) | 7.8 | 8.2 | 7.9 | 7.8 |
| Dissolved Oxygen (mg/l) | 4.1 | 6.6 | 7.5 | 6.6 |
| Conductivity (umhos/cm) | 20,450 | 14,800 | 32,893 | 27,850 |
| Turbidity (FTU) | 99 | 51 | 41 | 51 |
| Ammonia (mgN/l) | 5.9 | 7.0 | 0.74 | 2.9 |
| Nitrate (mgN/l) | 0.77 | 2.0 | 2.3 | 2.9 |
| Kjeldahl Nitrogen (mg/l) | 6.3 | 7.9 | 1.1 | 4.0 |
| Total Nitrogen (mg/l) | 7.1 | 9.9 | 3.4 | 6.9 |
| Orthophosphate (mgP/l) | 3.6 | 3.8 | 1.6 | 2.9 |
| Total Phosphorus (mg/l) | 4.5 | 4.2 | 2.5 | 3.0 |

Notes: FTU = Formazin turbidimetric units.
 umhos/cm = Micromhos per centimeter.
 mg/l = Milligrams per liter.
 mgN/l = Milligrams of nitrogen per liter.
 mgP/l = Milligrams of phosphorus per liter.

Sources: EPA, 1985.
 ESE, 1985.

Camp Parks Communications Annex

Because of its small size and location at the top of a hill, no surface water features exist on CPCA. Tassajara Creek receives drainage from CPCA and vicinity. This creek is located approximately 0.5 mile east of the site. Water quality of Tassajara Creek is characterized as slightly alkaline with high levels of sodium bicarbonate (U.S. Army Corps of Engineers, 1981).

3.4.2 GROUND WATER QUALITY

Sunnyvale AFS

Ground water underlying SAFS has been sampled and analyzed from one existing monitor well (adjacent to Bldg. 1007). The water was analyzed for selected volatile organic compounds (see App. F). Results indicated a trace of trans-1,2-dichloroethene, with a concentration below the level necessary for accurate quantitation. Regionally, the upper aquifer system exhibits organic contamination due to solvents discharged by the surrounding electronics industry. Analysis of ground water from one local electronics facility revealed elevated levels of various organic compounds, including trans-1,2-dichloroethene (Canonie Environmental Services, 1983).

Camp Parks Communications Annex

Prior to 1981, when bottled water usage began, a potable supply well was operated at CPCA. This well was installed in 1974 and is used for sanitary, irrigation, and other nonpotable purposes. No water quality data were available from this well. Prior to onbase water supply in 1974, water was supplied to CPCA by PRFTA. Analytical data for raw water from the PRFTA wells are summarized in Table 3.4-2. The PRFTA well fields are located approximately 1 mile southeast of PRFTA (Fig. 3.4-1). The data were obtained in five sampling events conducted from 1972 to 1977.

As shown by the data in Table 3.4-2, the ground water in the area is alkaline and very hard and contains high levels of dissolved solids. These characteristics are typical of ground water in the area obtained

Table 3.4-2. Summary of Ground Water Quality Data for PRFTA Wells

| Parameter | Federal Drinking Water Maximum Contaminant Level | Well 3001 | Well 3002 | Well 3003 |
|---|--|--------------|--------------|--------------|
| pH, Units | 6.5-8.5* | 7.5 | 7.6 | 7.5 |
| Alkalinity, mg/l as Calcium Carbonate (CaCO ₃) | | 344.0 | 342.0 | 334.0 |
| Total Hardness, mg/l as CaCO ₃ | | 449.0 | 524.0 | 494.0 |
| Specific Conductance, umhos/cm | | 1,717.0 | 1,563.0 | 1,540.0 |
| Total Dissolved Solids (TDS), 500* mg/l | | 837.0 | 824.0 | 804.0 |
| Calcium, mg/l | | 72.7 | 78.3 | 75.2 |
| Magnesium, mg/l | | 72.8 | 77.5 | 78.3 |
| Sodium, mg/l | | 113.6 | 75.0 | 63.6 |
| Chloride, mg/l | 250* | 182.0 | 162.2 | 159.0 |
| Sulfate, mg/l | 250* | 58.6 | 84.0 | 59.8 |
| Nitrate, mg/l as Nitrogen | 10† | 5.8 | 4.1 | 5.0 |
| Arsenic, mg/l | 0.05† | <0.02 | <0.02 | <0.02 |
| Barium, mg/l | 1.0† | <0.30 | 0.37 | 0.37 |
| Cadmium, mg/l | 0.01† | <0.002 | <0.002 | <0.002 |
| Chromium, mg/l | 0.05† | <0.04 | <0.04 | <0.04 |
| Copper, mg/l | 1.0* | <0.12 | <0.187 | <0.12 |
| Iron, mg/l | 0.3* | <0.10 | <0.10 | <0.10 |
| Lead, mg/l | 0.05† | <0.009 | <0.008 | <0.009 |
| Manganese, mg/l | 0.05* | <0.03 | <0.03 | <0.03 |
| Mercury, mg/l | 0.002† | 0.0027 | 0.0004 | 0.0044 |
| Selenium, mg/l | 0.01† | NA | NA | NA |
| Silver, mg/l | 0.05† | <0.021 | <0.021 | <0.021 |
| Zinc, mg/l | 5.0* | <0.213 | <0.223 | <0.213 |
| Fluoride, mg/l | 1.4-2.4† | 0.2 | 0.2 | 0.2 |
| Gross Alpha, pCi/l | 15.0† | 1.2 | 2.3 | 2.3 |
| Gross Beta, pCi/l | 50.0† | 3.2 | 3.9 | 3.0 |
| Tritium, pCi/l | 20,000 | 0.03 | 0.0406 | 0.0258 |

Note: PRFTA well field locations are shown in Fig. 3.4-1.

*NSDWR (EPA, 1984b).

†NIPDWR (EPA, 1984a).

Note: pCi/l = Picocuries per liter.

Sources: USAEHA, 1978.
ESE, 1985.

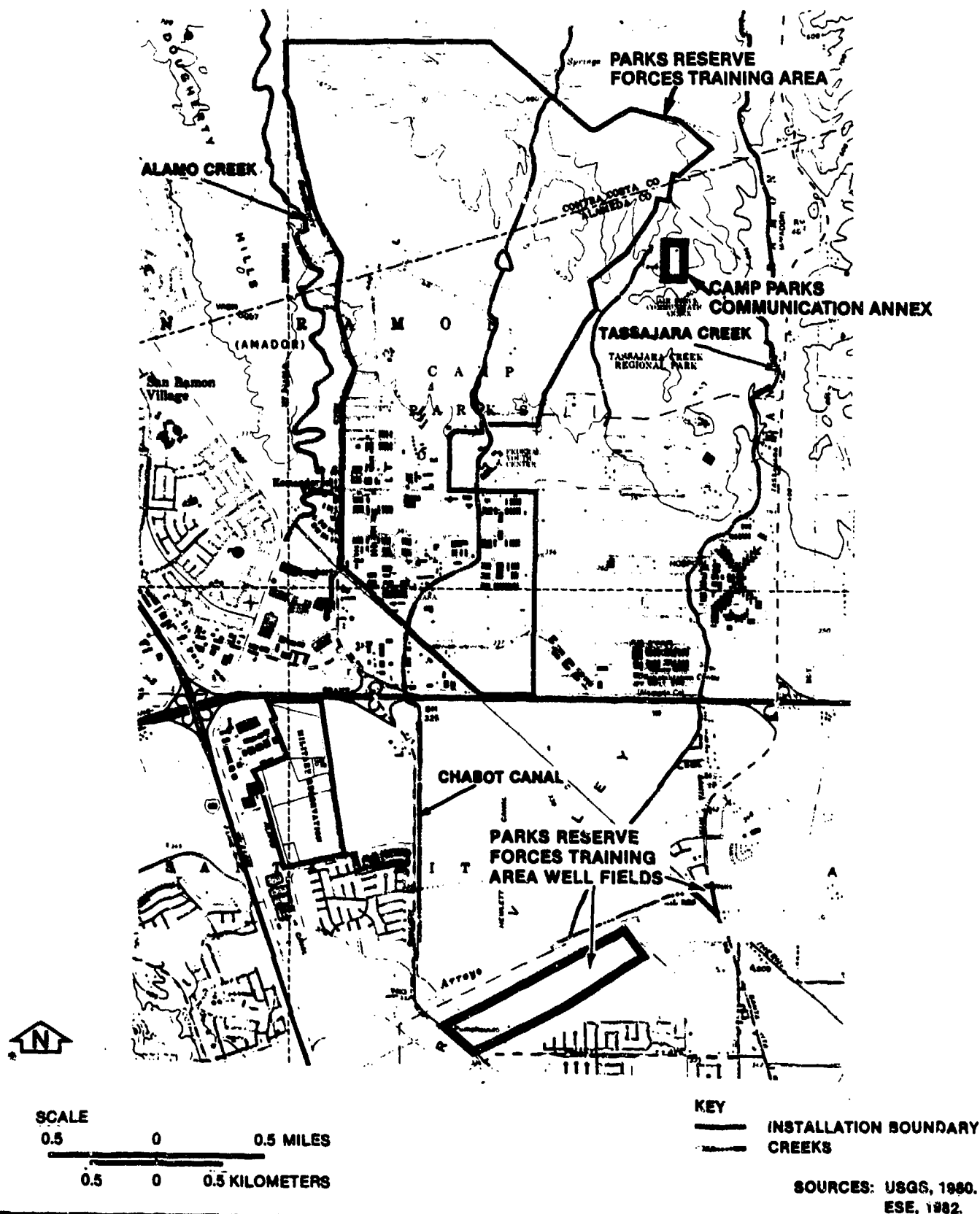


Figure 3.4-1
AREA MAP SHOWING THE LOCATION
OF PARKS RESERVE FORCES TRAINING
AREA WELL FIELDS

INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

from the sandstone, tuffaceous sandstone, and shale deposits that comprise the underlying Tassajara Formation. Included in Table 3.4-2 are the National Interim Primary Drinking Water Regulations (NIPDWR) (EPA, 1984a) and the National Secondary Drinking Water Regulations (NSDWR) (EPA, 1984b) maximum contaminant levels (MCLs) for the listed parameters. With the exception of total dissolved solids (TDS) and mercury, the raw ground water is within the NIPDWR and NSDWR MCLs for the parameters listed in Table 3.4-2. TDS levels range from 804 to 837 mg/l, which is well above the 500-mg/l criterion. High TDS levels in water from the Tassajara Formation are principally due to calcium, magnesium, and sodium bicarbonate and do not present a health-related concern. Levels of mercury (0.0027 to 0.0044 mg/l) were slightly above the NIPDWR MCL (0.002 mg/l). These mercury levels likely arise from either well head pump contamination or volcanic tuffs that are components of the underlying geologic formations. For example, in the upland areas surrounding San Francisco Bay, cinnabar (a mercuric sulphide mineral) is mined commercially.

3.4.3 POTABLE WATER QUALITY

Sunnyvale AFS

Potable water at SAFS is supplied by the City of Sunnyvale from the Hetch-Hetchy Reservoir, the Alameda East Portal, and the San Antonio Reservoir. No potable wells have been operated by the Air Force on SAFS.

Available results from analyses performed by the San Francisco Water Department Water Quality Division include a number of health-related NIPDWR and NSDWR parameters. Water supplied to SAFS conforms with the primary and secondary drinking water standards. Detailed water analyses on samples collected at SAFS have not been performed. Results of analyses performed on water supplied to SAFS are presented in App. F. No bacteriological water quality problems have been reported at SAFS.

Camp Parks Communications Annex

Because of the intermittent use of the annex, bottled water in a standard water cooler has been used for potable supply at CPCA since 1981. From 1974 until 1981, a potable supply well was used. Prior to 1974, water was supplied by PRFTA (see Sec. 3.4.2).

3.5 BIOTIC COMMUNITIES

Sunnyvale AFS

The station is situated in an industrial and commercial area of Sunnyvale. Due to the small size of the site, it is entirely developed with buildings, antenna, and paved vehicle parking areas. No natural vegetation communities and only scattered, cultivated plantings of ornamental trees and shrubs occur on the station.

As a result of the developed nature of the site and its urban location, wildlife diversity is small. Birds that may occur onbase are those species that typically inhabit urban areas of the San Francisco Bay area. These birds may forage in the shrubs and trees onbase. Due to human activity and lack of habitat on or adjacent to the station, few mammalian species are expected to occur. These would be limited to rodent species.

Camp Parks Communications Annex

The following description of biotic communities, including plant and animal species, was reported in an environmental impact statement prepared for PRFTA (U.S. Army Corps of Engineers, 1981). While no actual wildlife surveys or species counts have been performed specifically for CPCA, these species are expected to potentially occur on the annex.

The habitat of CPCA is predominantly valley grasslands with small areas of altered habitat. Common grasses include wild oats (Avena fatua), western rye grasses (Elymus glaucus), common barley (Hordeum vulgare), and common foxtail (Hordeum hystrix). Introduced forbs common onsite are black mustard (Brassica nigra), bindweed (Convolvulus arvensis),

bristly ox tongue (Picris echioides), and sweet fennel (Foeniculum vulgare) (U.S. Army Corps of Engineers, 1981). Altered habitats consist of buildings, pavement, and unpaved roads.

Grasslands support a variety of wildlife including mammals, birds, and reptiles. Common mammals include the California meadow mouse (Peromyscus californicus), western harvest mouse (Reithrodontomys megalotis), California mole, botta pocket gopher (Thomomys bottae), and black-tailed hare (Odocoileus hemionus) (U.S. Army Corps of Engineers, 1981).

A variety of large predatory birds and mammals occur in proximity to the site; however, these species probably do not occur onsite because of the small size of CPCA. Common birds of the property include American kestrel, burrowing owl (Falco sparverius), grasshopper sparrow (Ammodramus savannarum), Brewer's blackbird (Euphagus cyanocephalus), lesser goldfinch (Spinus psaltria), horned lark (Eremophila alpestris), and Say's phoebe (Sayornis saya) (U.S. Army Corps of Engineers, 1981).

Reptiles consist of western fence lizard (Sceloporus occidentalis), racer (Coluber constrictor), gopher snake (Pituophis melanoleucus), western skink (Eumeces skiltonianus), garter snake (Thamnophis elegans), and common kingsnake (Lamproprelatis getulus) (U.S. Army Corps of Engineers, 1981).

There are no wetland areas on the site.

3.6 ENVIRONMENTAL SETTING SUMMARY

Sunnyvale AFS

Most of the area surrounding SAFS consists of a gently sloping, nearly level area that contains residential housing located approximately 1,000 ft southeast of the facility, commercial establishments, paved streets, and parking areas. Elevations in the vicinity of SAFS range from 40 ft above MSL to sea level.

There are no surface water features at SAFS. The station is drained by a small canal that borders the southern and eastern edges of the

installation. Because a majority of SAFS consists of buildings and paved parking areas, most rainfall drains off the station as stormwater runoff.

SAFS has a mild, Mediterranean-type climate, with temperatures moderated by San Francisco Bay. The average monthly temperature ranges from a low of 48.0°F in January to a high of 65.5°F in July. The average annual rainfall is 12.99 inches, 83 percent of which occurs from November through March. The low value for net precipitation indicates a low potential for significant infiltration or the formation of permanent surface water features. The 1-year, 24-hour rainfall event of 3 inches indicates a moderate potential for runoff and erosion. Most of the installation, however, is asphalt-paved and contains stormwater drainage systems to control runoff, thus eliminating any potential for significant flooding and soil erosion.

The surficial lithology of SAFS consists of alluvial deposits of the San Jose Plain. Underlying the recent alluvium deposits is the Pleistocene Santa Clara Formation, which consists of nonmarine conglomerates, sandstones, siltstones, and clays. Underlying this formation, various marine sedimentary and volcanic units overlie the basement Franciscan Formation. It has been postulated that a dip-slip type fault is adjacent to SAFS. The extent and depth of subsurface movement along this fault is unknown. No surficial, vertical displacement is visible in the fault zone.

Two major aquifer systems are encountered in the vicinity of SAFS. The lower aquifer occurs at a depth of approximately 200 ft. This aquifer consists of sand and gravel overlain by a confining unit approximately 100 ft thick. Above the confining unit, an upper aquifer system occurs between ground surface and a maximum depth of 100 ft. Lateral ground water movement in the upper and lower aquifers would be approximately 100 ft per year. Migration of any contaminant entering the ground water system would be in a northerly direction with some downward movement.

Saltwater intrusion has occurred in the upper aquifer adjacent to San Francisco Bay from heavy pumping of the aquifer.

As a result of the developed nature of the installation and its urban location, wildlife habitat on or adjacent to the station is small. Vegetation is limited to cultivated species such as ornamental shrubs, bushes, and trees. Various urban bird species forage in the trees and on the lawns. Common rodents (e.g., mice) occur onbase. No state-listed or Federally listed threatened or endangered species are present.

Camp Parks Communications Annex

CPCA is situated approximately 23 miles northeast of SAFS. The 11.6-acre hilltop installation is located southeast of Dublin, Calif., and directly north of Pleasanton, Calif. Elevations at CPCA decrease in all directions from 690 ft above MSL to 640 ft above MSL at the installation boundary. The topographic gradient from Bldg. 2002 to the western boundary of CPCA is approximately -1 ft per 5 ft. Due to the location of CPCA on a hilltop, stormwater drainage occurs rapidly through a system of open ditches and swales. Stormwater runoff drains approximately 0.5 mile east of the installation to Tassajara Creek.

The climate of CPCA is mild, with average monthly temperatures ranging from a low of 45.7°F in January to a high of 71.3°F in July. The average annual temperature is 58.7°F. Average annual rainfall is 14.11 inches, 81 percent of which occurs from November through March.

Net precipitation is -29.90 inches per year, and the 1-year, 24-hour rainfall event is 2 inches. The low value for net precipitation indicates a low potential for significant infiltration. The 1-year, 24-hour rainfall event of 2 inches indicates a moderate potential for runoff and erosion.

CPCA is located in Amador Valley, the western portion of Livermore Valley. The Livermore Valley is composed of a downwarped and faulted sequence of Miocene and Pliocene sandstones and conglomerates. CPCA is underlain by the Pliocene Tassajara Formation, consisting of bedding deposits of sandstone, tuffaceous sandstone, and shale. CPCA is located in a seismically active region, with the Pleasanton Fault suspected approximately 2.5 miles west of the annex.

CPCA is underlain by the Camp subbasin, a portion of the Livermore Valley Ground Water Basin. The subbasin covers an area of 2,858 acres and is drained by Tassajara Creek and Cottonwood Creek. Well yields are relatively low in the Camp subbasin due to the presence of shale units with low permeability. Recharge to the aquifer system occurs through infiltration of precipitation within the outcrop areas.

The habitat of CPCA is predominantly valley grasslands with small areas of altered habitat. The grasslands are occupied primarily by a variety of introduced species. Common grasses include wild oats, western rye grasses, common barley, and common foxtail.

Grasslands support a variety of wildlife, including mammals, birds, and reptiles. Common mammals include mice, moles, gophers, and hares.

A variety of large predatory birds and mammals occur in proximity to the site; however, these species probably do not occur onsite because of the small size of CPCA. Common birds of the property include American kestrel, burrowing owl, sparrows, blackbirds, finches, and larks. Reptiles found onbase consist of lizards, snakes, and skinks.

4.0 FINDINGS

To assess hazardous waste management at SAFS and CPCA, past activities of waste generation and disposal methods were reviewed. This section contains a summary of hazardous wastes generated, descriptions of waste disposal methods, identification of the disposal sites onbase, and evaluation of the potential for environmental contamination.

4.1 CURRENT AND PAST ACTIVITY REVIEW

To identify past activities that resulted in the generation and disposal of hazardous waste, current and past waste generation and disposal methods were reviewed. This activity consisted of a review of files and records, interviews with current and former base employees, and site inspections.

SAFS and CPCA operations described in this section are those which handle, store, or dispose of potentially toxic or hazardous materials. These operations include industrial and laboratory operations and activities in which pesticides; polychlorinated biphenyls (PCB); petroleum, oils, and lubricants (POL) (including organic solvents); radiological materials; and explosives are handled. No large-scale product-manufacturing operations have been conducted at SAFS or CPCA. Industrial operations conducted at SAFS are primarily maintenance-support functions provided for facilities, electronic equipment, satellite tracking antennas, and power production.

Since the initiation of industrial activity in 1959, various disposal practices for wastes have been used. In general, past waste disposal methods conformed to standard practices for that time period. With the promulgation of State of California and EPA regulations in the 1970s controlling toxic and hazardous materials, many disposal practices changed. Since then, regulated wastes have been disposed of offsite by hazardous waste contractors in approved hazardous waste disposal facilities.

Industrial activity, waste composition, and generation rates at SAFS have remained relatively constant since 1960. Often, specific information concerning waste generation rates and waste types of the early industrial activity was not available during the onsite survey. Therefore, unless otherwise stated, current waste types, generation rates, and shop locations are assumed to be representative of historical Air Force activity. App. E contains a list of shops currently operating on SAFS. Past and current shops, activities, and waste treatment, storage, and disposal practices are discussed in this section.

A summary of waste generation from SAFS industrial operations is presented in Table 4.1-1. Industrial shops; activities; and waste treatment, storage, and disposal are described in the following paragraphs. (Waste disposal, hazardous or otherwise, that is handled by contract will be referred to as "contract disposal" throughout this report.)

4.1.1 INDUSTRIAL OPERATIONS

4.1.1.1 AIR FORCE SATELLITE CONTROL FACILITY

CIVIL ENGINEERING

Power Plant

The SAFS Power Plant (gas turbine design) was constructed in 1971 to provide energy self-sufficiency to the Air Force Station.

Maintenance--Power Plant Maintenance (Bldgs. 1004 and 1007) generates waste lube oil [1,600 gallons per year (gal/yr)], solvent containing chlorinated hydrocarbons (60 gal/yr), and a detergent-based aircraft-cleaning compound (100 gal/yr). Since operational startup of the power plant in 1971, waste lube oil and solvent have been contract disposed. Also since 1971, the aircraft-cleaning compound has been diluted and discharged to the sanitary sewer system for treatment.

Table 4.1-1. Sunnyvale AFS Industrial Operations--Waste Generation

| Shop Name | Location (Bldg. No.) | Waste Material | Waste Quantity (gal/yr)* | Waste Management Practices | | | |
|--|-------------------------|--|--------------------------------|----------------------------|------|------|--|
| | | | | 1950 | 1960 | 1970 | 1980 |
| I. AIR FORCE SATELLITE CONTROL FACILITY | | | | | | | |
| A. Civil Engineering | | | | | | | |
| 1. Power Plant | | | | | | | |
| a. Maintenance | 1004, 1007 | Lube oil | 1,600 | | | | Contract disposal |
| | | Solvent (contains chlorinated hydrocarbons) | 60 | | | | Contract disposal |
| | | Aircraft- cleaning compound (alkali detergent) | 100 | | | | Diluted and discharged to sanitary sewer |
| b. POL Area | | | | | | | |
| | 1011 | Fuel sludge | Variable | | | | Contract disposal |
| | | Oily water (from JP-5 auto water separator) | 900 | | | | Contract disposal |
| | | Fuel filter cartridges | 120/yr | | | | Contract disposal |
| c. Cooling System | | | | | | | |
| | 1007 | Cooling tower blowdown | <2,000 gpd | | | | Discharged to sanitary sewer |
| | | Boiler blow- down | 2,000 gpd | | | | Discharged to sanitary sewer |

Table 4.1-1. Sunnyvale AFS Industrial Operations--Waste Generation (Continued, Page 2 of 4)

| Shop Name | Location (Bldg. No.) | Waste Material | Waste Quantity (gal/yr)* | Waste Management Practices | | | |
|----------------------------------|-------------------------|---|--------------------------------|----------------------------|------|--|-------------------------------------|
| | | | | 1950 | 1960 | 1970 | 1980 |
| c. Cooling System (continued) | | Filter backwash | Variable | | | Discharged to storm drain | Discharged to sanitary sewer |
| | | Water treatment analytical chemicals | Variable (small) | | | | Discharged to sanitary sewer |
| | 2. Paint Shop | Paint wastes | 20 | | | | Contract disposal |
| | | Thinner (mineral spirits, lacquer) | 100 | | | | Contract disposal |
| 3. Facilities Engineering | | Stripper | 10 | | | | Contract disposal |
| | 1002 | Sanitary sewage | 70,000 gpd | | | Discharged to City of Sunnyvale sewage system | |
| | | Solid waste (refuse) | 200 tons/ month | | | | Hauled to Offbase Sanitary landfill |
| II. 6594TH AIR BASE SQUADRON | | | | | | | |
| A. Security Police | 1028 | Rifle bore cleaner | <1 | | | Hauled to NAS Moffett Field for contract disposal | |
| B. Reprographics | 1001 | Rags (contaminated with chlorinated solvent) | Variable | | | Hauled to offbase sanitary landfill | |

Table 4.1-1. Sunnyvale AFS Industrial Operations--Waste Generation (Continued, Page 3 of 4)

| Shop Name | Location (Bldg. No.) | Waste Material | Waste Quantity (gal/yr)* | Waste Management Practices | | | |
|--|-------------------------|---|--------------------------------|----------------------------|------|------|--------------------------------------|
| | | | | 1950 | 1960 | 1970 | 1980 |
| III. 1999TH COMMUNICATIONS | | | | | | | |
| SQUADRON--ANTENNA MAINTENANCE | 1012, 1009 | Ethylene glycol | 110 | | | | Contract disposal |
| | | Transmission fluid | 80 | | | | Contract disposal |
| | | Lube oil | 20 | | | | Contract disposal |
| | | Kerosene | 10 | | | | Contract disposal |
| | | Alkaline, detergent-based Aircraft-cleaning compound† | 20 | | | | Discharged to storm drain |
| IV. CONTRACTOR | | | | | | | |
| A. Ford Aerospace and Communications Corp.-- Data Link Terminal Maintenance | 1016 | Lube oil | 20 | | | | Given to employee for use offbase |
| | | Grease | 15 lb/yr | | | | Hauled to off-base Sanitary landfill |

Table 4.1-1. Sunnyvale AFS Industrial Operations--Waste Generation (Continued, Page 4 of 4)

| Shop Name | Location (Bldg. No.) | Waste Material | Waste Quantity (gal/yr)* | Waste Management Practices | | | |
|-----------|-------------------------|-------------------|--------------------------------|----------------------------|------|------|---|
| | | | | 1950 | 1960 | 1970 | 1980 |
| | | Oily rags | Variable | | | | Hauled to off- base sanitary landfill |

*Unit of measurement is gallons per year (gal/yr) unless indicated otherwise.
†Permit pending; see text.

Key:

- Confirmed timeframe and disposal data from shop personnel.
- Estimated timeframe and disposal data from shop personnel.
- > Arrow indicates current practice at time of site visit.
- gpd Gallons per day.

Source: ESE, 1985.

POL Area--Waste generation from the power plant POL area (Facility 1011) includes fuel sludge (variable generation rate), oily water from the jet propellant (JP-5)/water separator (900 gal/yr), and spent fuel filter cartridges (120 cartridges/yr). Fuel sludges have been contract disposed since 1971. The oily water and fuel filter cartridges have been contract disposed since the installation of the separator and filter components in 1974.

Cooling System--The power plant cooling system (Facility 1007) generates waste cooling tower blowdown [$\leq 2,000$ gallons per day (gpd)], boiler blowdown (2,000 gpd), filter backwash (variable quantity), and water treatment analytical chemicals (variable but small quantity). Since installation of the cooling system in 1971, the cooling tower blowdown, boiler blowdown, and analytical chemicals have been discharged to the sanitary sewer. Filter backwash was discharged to a storm drain from 1979 to 1982 and discharged to the sanitary sewer from 1982 to present.

Paint Shop

The Civil Engineering Paint Shop (Bldg. 1001) produces waste paint (20 gal/yr), waste thinner (100 gal/yr), and waste stripper (10 gal/yr). All paint shop wastes have been contract disposed since 1970.

Facilities Engineering

Wastes from Facilities Engineering (Bldg. 1002) include sanitary sewage (average 70,000 gpd) and solid waste (200 tons/month). Sanitary sewage has been discharged to the City of Sunnyvale sewage system for treatment since 1959. Solid waste (refuse) has been hauled to offbase sanitary landfills since 1959.

4.1.1.2 6594TH AIR BASE GROUP

SECURITY POLICE

The Security Police (Bldg. 1028) constructed an armory at SAFS in 1983. Prior to 1983, all weapons were stored and maintained offbase. Rifle bore cleaner (< 1 gal/yr) is the typical waste material generated through

weapons maintenance. Since 1983, waste rifle bore cleaner has been sent to NAS Moffett Field for contract disposal.

REPROGRAPHICS

Reprographics (Bldg. 1001) generates variable quantities of cleaning rags contaminated with chlorinated solvent at a variable rate. Since 1959, the rags have been hauled to an offbase sanitary landfill for disposal.

4.1.1.3 1999TH COMMUNICATIONS SQUADRON

ANTENNA MAINTENANCE

The 1999th Communications Squadron is responsible for the operation and maintenance of two large satellite tracking antennas (Facilities 1012 and 1009). Waste generation through normal maintenance includes ethylene glycol (110 gal/yr), transmission fluid (80 gal/yr), lube oil (20 gal/yr), kerosene (10 gal/yr), and a detergent (an alkaline, water base compound diluted 20:1) aircraft-cleaning compound (20 gal/yr). Since installation of the antennas in 1976, the waste ethylene glycol, transmission fluid, lube oil, and kerosene have been contract disposed. The aircraft-cleaning compound has been discharged to a storm drain. (Subsequent to the site visit, the installation has applied to the California Regional Water Quality Control Board for a wastewater discharge permit for this discharge.)

4.1.1.4 CONTRACTORS

FORD AEROSPACE AND COMMUNICATIONS CORP.--DATA LINK TERMINAL MAINTENANCE

The Ford Data Link Terminal operates and maintains a large satellite tracking antenna at the north end of SAFS (Facility 1016). Wastes generated through routine maintenance are lube oil (20 gal/yr), grease [15 pounds per year (1b/yr)], and oily rags (variable quantity). Since 1976, the waste lube oil reportedly has been given to a Ford employee for personal use offbase. The waste grease and oily rags have been hauled to an offbase sanitary landfill.

4.1.1.5 CAMP PARKS COMMUNICATIONS ANNEX

EQUIPMENT MAINTENANCE

Industrial operations at CPCA (Bldg. 2001) are limited mainly to electronic equipment and component maintenance. These operations are summarized in Table 4.1-2. Waste materials generated as a result of this maintenance are paint thinner (<1 gal/yr), kerosene (<5 gal/yr), methy ethyl ketone (MEK) (<1 gal/yr), acetone (<1 gal/yr), alcohol (1 gal/yr), rags and empty chemical containers (variable quantity), Bright Dip® (chromic acid) (<1 gal/yr), and solid waste [2 cubic yards (yd³)/week]. Since operational startup in 1960, the waste paint thinner, kerosene, MEK, acetone, and alcohol have been disposed of by allowing the wastes to evaporate from the parking area. From 1960 to 1972, the waste Bright Dip® was discharged via a sink drain to a dry well adjacent to Bldg. 2001. Since 1960, all solid waste (including rags and empty containers) has been hauled to an offbase sanitary landfill.

4.1.2 LABORATORY OPERATIONS

Laboratory operations at SAFS are performed by the 1369th Audiovisual Squadron (AVS) Reproduction and Photographic Laboratory. This laboratory's location; wastes generated; and waste treatment, storage, and disposal methods are summarized in Table 4.1-3. The operations are briefly described in the following paragraph.

The Reproduction and Photographic Laboratory (Bldg. 1001) generates waste photographic developer (60 gal/yr), fixer (300 gal/yr), and scrap film (180 lb/yr). Since 1959, the waste developer has been discharged to the sanitary sewer for treatment. Also since 1959, the waste fixer and scrap film have been hauled to NAS Moffett Field for silver recovery.

4.1.3 PESTICIDE HANDLING, STORAGE, AND DISPOSAL

Pesticides are used at SAFS by KILLROY Pest Control, Inc. to maintain grounds and structures and to prevent pest-related problems. Prior to

Table 4.1-2. Camp Parks Communications Annex Industrial Operations--Waste Generation

| Shop Name | Location (Bldg. No.) | Waste Material | Waste Quantity (gal/yr)* | Waste Management Practices | | |
|-----------------------|-------------------------|----------------------------|--------------------------------|----------------------------|------|-------------------------------------|
| | | | | 1950 | 1960 | 1980 |
| Equipment Maintenance | 2001 | Paint thinner | <1 | | | Evaporated from parking area |
| | | Kerosene | <5 | | | Evaporated from parking area |
| | | Methyl ethyl ketone | <1 | | | Evaporated from parking area |
| | | Acetone | <1 | | | Evaporated from parking area |
| | | Alcohol | 1 | | | Evaporated from parking area |
| | | Rags and empty containers | Variable | | | Hauled to offbase sanitary landfill |
| | | Bright Dip® (chromic acid) | <1 | | | Sink disposal to dry well |
| | | Solid waste (refuse) | 2 yd ³ /wk | | | Hauled to offbase sanitary landfill |

*Unit of measurement is gallons per year (gal/yr) unless indicated otherwise.

Key:

- Confirmed timeframe and disposal data from shop personnel.
- Estimated timeframe and disposal data from shop personnel.
- > Arrow indicates current practice at the time of the site visit.

Source: ESE, 1985.

Table 4.1-3 Sunnyvale AFS Laboratory Operations--Waste Generation

| Shop Name | Location (Bldg. No.) | Waste Material | Waste Quantity (gal/yr)* | Waste Management Practices | | | |
|--|-------------------------|-------------------|--------------------------------|--|------|------|------|
| | | | | 1950 | 1960 | 1970 | 1980 |
| 1369th AVS Reproduction and Photographic Lab | 1001 | Developers | 60 | | | | |
| | | Fixers | 300 | | | | |
| | | Film | 180 lb/yr | | | | |
| | | | | Discharged to sanitary sewer | | | |
| | | | | Hauled to NAS Moffett Field for silver recovery | | | |
| | | | | Hauled to NAS Moffett Field for silver recovery | | | |

*Unit of measurement is gallons per year (gal/yr) unless indicated otherwise.

Key:

- Confirmed timeframe and disposal data from shop personnel.
- Estimated timeframe and disposal data from shop personnel.
- Arrow indicates current practice at the time of the site visit.

Source: ESE, 1985.

1973, Lockheed Missile and Space Co. was responsible for pest management at SAFS. Those pest management practices were reported to have been the same as current practices.

According to available records, pesticides have been stored and mixed off the station throughout the history of the installation by the respective contractors. An inventory for the pesticides applied at SAFS is presented in Table 4.1-4. The SAFS groundskeeper stores a single 1-pint container of Diazinon for spot application around SAFS. No liquid wastes are generated from this application. Empty containers from this application are broken and included with building refuse for disposal in a sanitary landfill.

Pest control at CPCA is limited to weed and rodent control. Weed-B-Gone® (2,4,5-T) was applied for weed control by Lockheed up to 1983 when AMEX Systems, Inc. assumed pest-control responsibilities. Rodents (up to 400/yr) are caught live and transported off the installation by the contractor. As with SAFS, no pesticides have been stored or mixed at CPCA.

4.1.4 PCB HANDLING, STORAGE, AND DISPOSAL

The SAFS electrical equipment and distribution system have been maintained by AMEX Systems, Inc. since 1973. From 1959 to 1973, the electrical system was maintained by Lockheed as the operating contractor. All but minor repairs and maintenance are performed by offbase contractors. Before 1973, minor repairs were reportedly performed by Lockheed offbase. Major repairs were performed by offbase subcontractors working for Lockheed. A list of PCB transformers at SAFS is presented in Table 4.1-5.

Since 1973, no transformers have been taken out of service at SAFS. No records exist for transformers from the period before 1973. In December 1984, two 55-gal drums containing PCB-contaminated rags, cardboard, and absorbent clay granules were transported from SAFS by

Table 4.1-4. SAFS Pesticides Inventory

| Pesticide | Rodenticide |
|----------------|-------------|
| Ficam W | Talon G |
| Diazinon 4E | |
| Diazinon 260 | |
| Resmethrin 110 | |
| Ramik Green | |
| Max Force® | |
| Baygon® | |
| Knoxout® | |
| Dursban 270 | |

Sources: AFSCF, 1983, 1984c.
ESE, 1985.

Table 4.1-5. PCB Transformers on SAFS

| Room Number* | Number of Transformers | Volume of Fluid (gal) |
|--------------|------------------------|-----------------------|
| 107 | 3 | 260 |
| | | 255 |
| | | 280 |
| 167 | 2 | 208 |
| | | 308 |
| 326 | 2 | 281 each |
| 426 | 2 | 74 |
| | | 153 |
| 498 | 1 | 297 |

*All PCB transformers are located in Bldg. 1001 in the rooms indicated.

Sources: Sunnyvale Dept. of Public Safety, 1982.
ESE, 1985.

Transformer Fluid Services, Inc. of San Jose, Calif., to a hazardous waste landfill operated by U.S. Ecology, Inc. in Beatty, Nev. The wastes were generated during routine cleanup of small leaks from the PCB transformers located in Bldg. 1001.

4.1.5 POL HANDLING, STORAGE, AND DISPOSAL

The types of POL used and stored at SAFS include jet propellant (JP-5), natural gas, kerosene, petroleum-based solvents, hydraulic fluid, and lube oil. No POL materials are used or stored at CPCA.

In addition to fixed storage tanks, drums and smaller containers are used for aboveground storage of incoming and waste materials, mainly solvents, hydraulic fluid, and lube oil. POL spill management is addressed in the SAFS Civil Engineering Oil and Hazardous Materials Pollution Contingency Plan and the Base Civil Engineer's Emergency Fuel Leak/Spill Procedures. These plans are revised regularly to ensure that they accurately reflect POL storage and spill prevention/containment.

Existing Aboveground POL Storage

Seven existing aboveground storage tanks were identified at SAFS. These JP-5 storage tanks range in size from 10,000 to 50,000 gal, with a total aboveground storage tank capacity of 270,000 gal. All seven storage tanks are enclosed in the POL storage area (Facility 1011). Spill containment consists of gravel bedding and a concrete dike surrounding the storage area.

The only other aboveground POL storage tank is a 500-cubic-foot natural gas accumulator located in the southeast corner of the POL storage area.

Existing Underground POL Storage

Three existing underground POL storage tanks, with a total capacity of 62,700 gal, were identified at SAFS. Two of the tanks contain JP-5, with a capacity of 31,000 gal each. These tanks are located under Bldg. 1007. The third underground tank is located near the northeast

corner of the POL storage area. This tank has a 700-gal capacity and contains waste POL.

Abandoned POL Storage

There were no abandoned POL storage tanks identified at SAFS.

Waste POL Storage, Handling, and Disposal

Waste POL at SAFS include waste fuels, lube oils, petroleum-based solvents, and hydraulic fluids. The generation and disposal of waste POL are summarized in Table 4.1-1 (in Sec. 4.1.1).

Wastes are stored at their generation points in drums, aboveground tanks, and underground tanks until the maximum storage capacity is reached.

Waste lube oil from the power plant is collected behind Bldg. 1004 and transferred to either 55-gal drums or a 700-gal underground waste POL tank (depending on available storage) for temporary storage.

Since initiation of industrial activities in 1959, all waste POL has been contract disposed by offbase waste oil dealers. Reportedly, no waste POL has been disposed of at SAFS.

Waste POL generated at CPCA (<5 gal/yr of kerosene) is allowed to evaporate from the CPCA parking lot.

4.1.6 RADIOACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL

According to available records, no radioactive materials have been used, stored, or disposed of at SAFS or CPCA.

4.1.7 EXPLOSIVE/REACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL

The only explosive materials stored at SAFS are small-rounds ammunition for the Security Police (Bldg. 1003). Access to this area is

controlled. Available records indicate that no other explosive or reactive materials have been used, stored, or disposed of at SAFS or CPCA.

4.2 WASTE DISPOSAL METHODS AND DISPOSAL SITE IDENTIFICATION, EVALUATION, AND HAZARD ASSESSMENT

As described in the current and past activity review (Sec. 4.1), various methods have been used for disposal of wastes generated by SAFS and CPCA operations. Because of the small sizes and urban location (SAFS) of the installations, no large-scale onsite disposal methods such as landfilling, open burning, or landspreading have been used.

Depending on type, wastes have either been transported offsite to municipal landfills, contract disposed to POL recycling companies, or discharged to the stormwater or sanitary sewer systems. In each of these cases, the wastes ultimately are transported offsite, leaving minimal or no potential for residual onsite contamination. One site (DS-1) on CPCA, however, was identified as having a potential for residual contamination. This site (DS-1) is an underground dry well that received discharge from a sink in the maintenance area of Bldg. 2001. The following paragraphs describe the disposal sites that were identified in Sec. 4.1.

4.2.1 STORMWATER DRAINAGE DISPOSAL SITES

Two stormwater drainage disposal sites were identified on SAFS. Site descriptions, designations used in this report, dates of operation, and waste descriptions are listed in Table 4.2-1. The locations of these sites are shown in Fig. 4.2-1.

Stormwater Drainage System Disposal Site No. 1 (SD-1)

Filter backwash water from the power plant cooling system (Bldg. 1007) was discharged to the stormwater drainage system from 1979 to 1982. The stormwater drainage system discharged into a drainage canal located adjacent to the station. This wastewater is currently discharged to the sanitary sewer system.

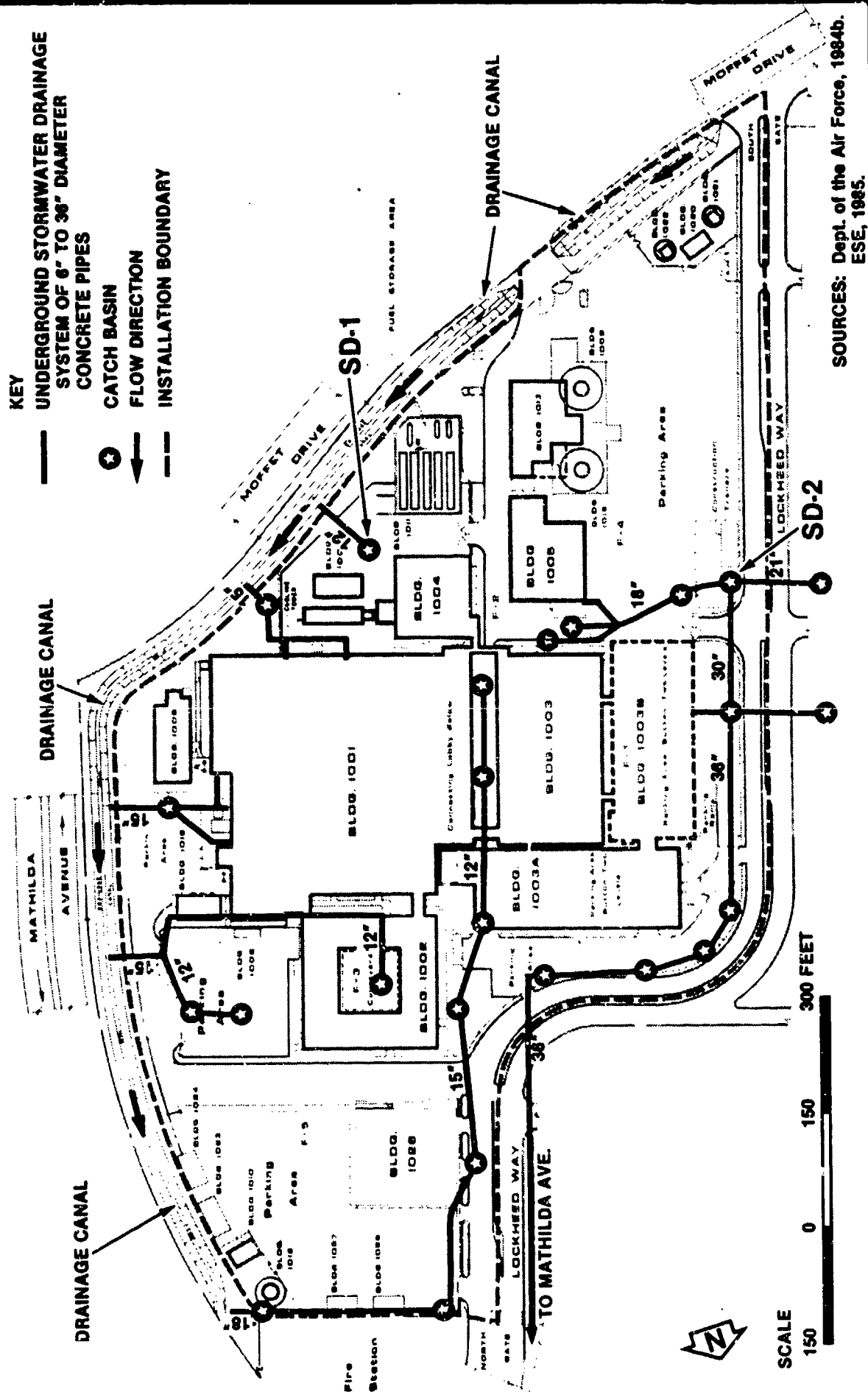
Stormwater Drainage System Disposal Site No. 2 (SD-2)

Washwater generated by antenna maintenance operations is discharged to a storm drain adjacent to Bldg. 1012. A detergent-based aircraft-cleaning

Table 4.2-1. Summary of Information on SAFS Stormwater Drainage System Disposal Sites

| Site Description | Designation | Dates of Operation | Waste Description |
|--|-------------|--------------------|---|
| Storm Drain Bldg. 1007, Cooling Tower Filter Backwash | SD-1 | 1979-1982 | Filter backwash containing suspended solids |
| Storm Drain, Bldgs. 1009 and 1012, Washwater from Antenna Maintenance | SD-2 | 1976-Present | Washwater from antenna maintenance containing an alkaline detergent-based aircraft-cleaning compound |

Source: ESE, 1985.



INSTALLATION RESTORATION PROGRAM SUNNYVALE AIR FORCE STATION

**Figure 4.2-1
STORMWATER DRAINAGE DISPOSAL SITES ON SAFS**

compound is used in the cleaning process. The stormwater drainage system discharges to a stormwater drain along Lockheed Way, eventually emptying into the drainage canal adjacent to the station. The washwater contains detergent surfactants from the cleaning compound and suspended solids. Because this is an ongoing operation, a discharge permit may be required. (Subsequent to the site visit, the installation has applied to the California Regional Water Quality Control Board for a wastewater discharge permit for this discharge.)

4.2.2 LANDFILLS

No landfills used for either sanitary or debris disposal were identified at SAFS. All wastes generated at SAFS were hauled offbase for disposal.

No landfills were used on CPCA for disposal of sanitary waste or debris. All solid wastes generated at CPCA have been hauled to an offbase landfill. Interviews with CPCA personnel reveal no burial or disposal of solid wastes within CPCA.

4.2.3 FUEL SPILL SITES

Records indicate that one large POL spill occurred at SAFS. In March 1980, approximately 1,000 gal of JP-5 were lost during tank rotation in the fuel circulation system as a result of a partially open valve. Approximately 300 gal were contained on SAFS; the remainder was contained within the drainage ditch adjacent to the station. This spill site is shown as FS-1 in Fig. 4.2-2. The 700 gal that entered the drainage channel were removed with contaminated water. A sandbag levee approximately 500 ft downgradient contained the spill. Due to the proper remedial actions, this spill has minimal or no potential for contamination or migration. Therefore, based on the decision process outlined in Fig. 1.3-1, this site was deleted from further consideration.

Several smaller fuel spills have occurred on SAFS. In 1980, approximately 10 gal of JP-5 were spilled during operation in the fuels area (site designated FS-2 in Fig. 4.2-2). The soil in the spill area was removed and contained for disposal by a private contractor. In

**Figure 4.2-2
FUEL SPILL SITES ON SAFS**

**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**

1983, a 5-gal POL spill (FS-3) occurred near the satellite communications antenna near Bldg. 1009. The area was cleaned with a detergent-based aircraft-cleaning compound and rinsed to the storm drain. Due to cleanup procedures, these spills have minimal or no potential for contamination or migration. Therefore, based on the decision process outlined in Fig. 1.3-1, these sites were deleted from further consideration.

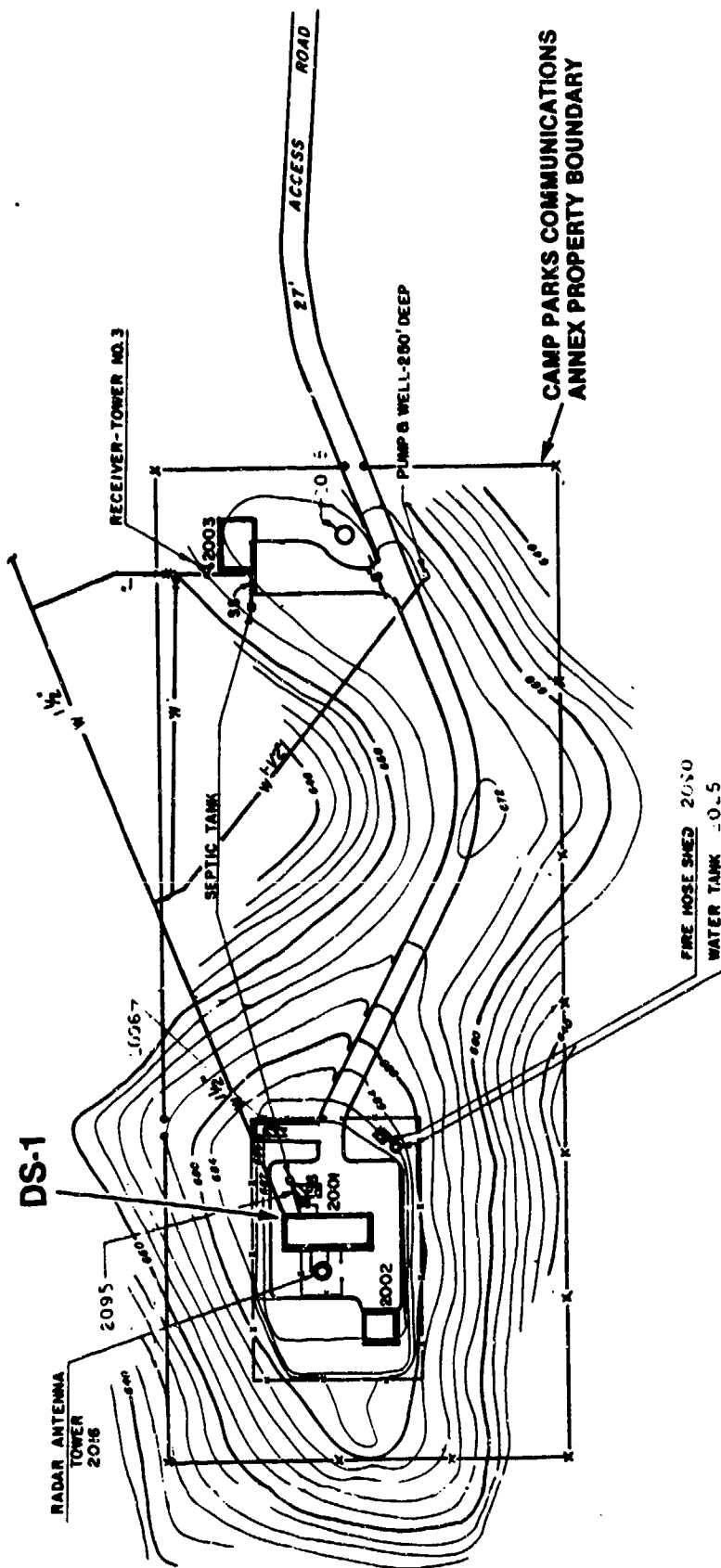
No fuel spill sites were identified on CPCA.

4.2.4 FIREFIGHTER TRAINING AREA

No firefighter training areas were identified at SAFS or CPCA. Due to the sizes and missions of the installations, no burn pits, smokehouses, or mock aircraft were used for training purposes.

4.2.5 CHEMICAL DISPOSAL SITES

No chemical disposal sites were identified on SAFS. A sink located in the maintenance area of Bldg. 2001 at CPCA discharges to an underground dry well located adjacent to the southeast corner of the building. The sink drain wet well disposal site is designated as DS-1 (see Fig. 4.2-3). Fig. 4.2-4 shows the construction details of this dry well. As shown in Fig. 4.2-4, the floor drains in Bldg. 2001 also discharge to dry wells. These dry wells were installed at the time the facility was constructed (1960) to prevent detergent-type wastes from entering the septic tank sanitary disposal system and disrupting the biological treatment process. Several of the floor drains are no longer operational, and the others are not currently used. In the past, the sink had been used for disposal of small quantities of various chemicals used in maintenance operations, including a chromic acid Bright Dip® solution. Because of the small volumes disposed and infrequent use of the sink, residual contamination is expected to be minimal with no potential for migration. Because the sink discharges to the dry well, the potential exists for future contamination from accidental spillage or inadvertent disposal of toxic or hazardous materials in the sink.

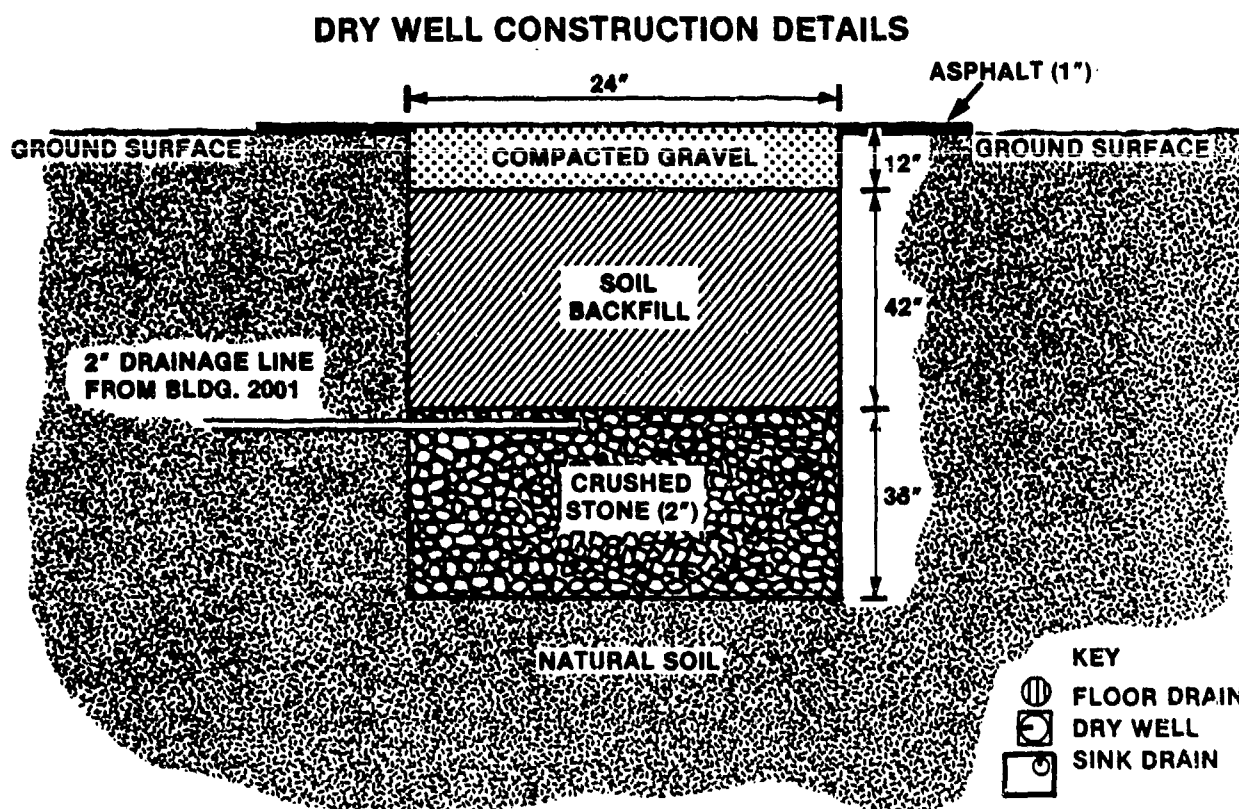
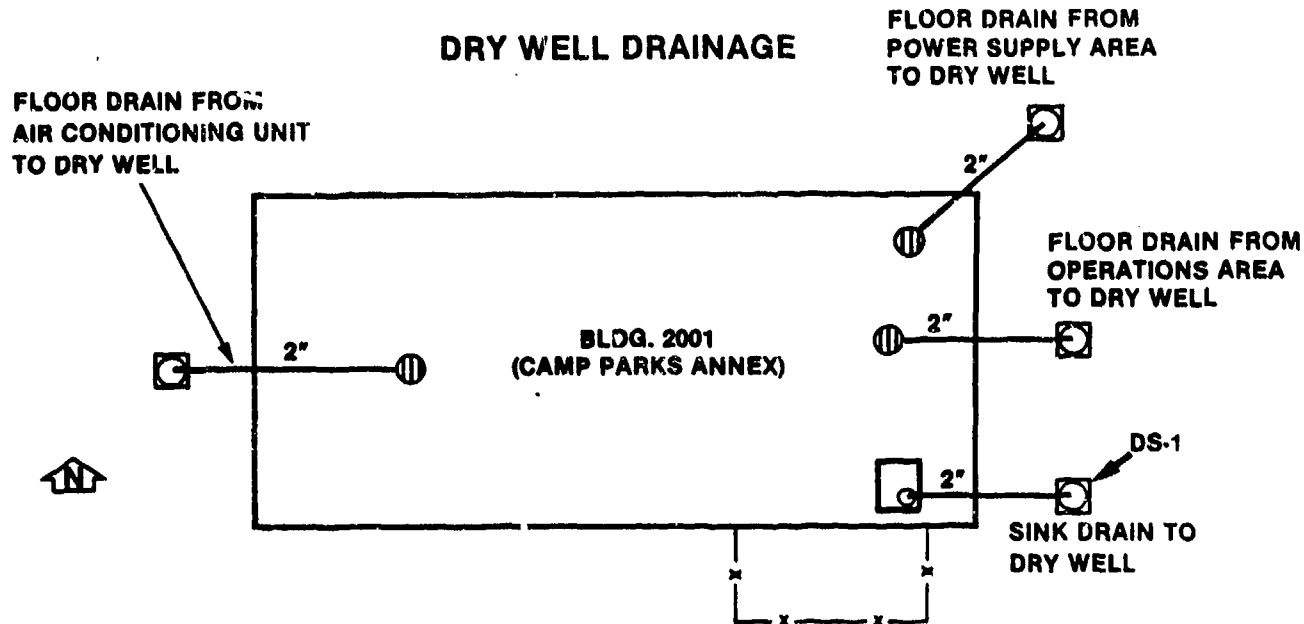


SCALE
100 0 100 200 FEET

SOURCES: Dept. of the Air Force, 1984b.
ESE, 1985.

INSTALLATION RESTORATION PROGRAM SUNNYVALE AIR FORCE STATION

Figure 4.2-3
LOCATION OF WELL-WELL DISPOSAL SITE DS-1



SOURCE: ESE, 1985.

Figure 4.2-4
LOCATIONS AND CONSTRUCTION DETAIL
FOR THE DRY WELLS ADJACENT TO
BLDG. 2001 AT CPCA

**INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION**

4.2.6 HAZARD EVALUATION ASSESSMENT

The review of past operation and maintenance functions and past waste management practices at SAPS and CPCA has resulted in the identification of six sites that were initially considered areas of concern, with potential for contamination. These sites, described in Secs. 4.2.1 through 4.2.5, were evaluated using the decision process presented in Fig. 1.3-1 (in Sec. 1.3). The results of this decision process are summarized in Table 4.2-2. All six sites were found to have little or no potential for contamination or contaminant migration and, thus, were not evaluated using the HARM system. Operational procedures at two of these sites (SD-2 at SAPS and DS-1 at CPCA) were deemed to warrant review and modification under the base environmental program. These sites are identified under the column "Refer to Base Environmental Programs" in Table 4.2-2.

Table 4.2-2. Summary of Decision Process Logic for Areas of Initial Environmental Concern at SAFS and CECA

| Site Description | Designation | Potential For Contamination | Potential For Contaminant Migration | Potential For Other Environmental Concern | Refer to Base Environmental Programs | HARM Rating |
|---|-------------|-----------------------------|-------------------------------------|---|--------------------------------------|-------------|
| Bldg. 1007, Cooling Tower Filter Backwash | SD-1 | No | No | No | No | No |
| Bldgs. 1009 and 1012, Wastewater from Antenna Maintenance | SD-2 | No | No | No | Yes | No |
| Fuel Spill Site No. 1 | FS-1 | No | No | No | No | No |
| Fuel Spill Site No. 2 | FS-2 | No | No | No | No | No |
| Fuel Spill Site No. 3 | FS-3 | No | No | No | No | No |
| Bldg. 2001, Dry Well Disposal Site | DS-1 | Yes | No | No | Yes | No |

Source: ESE, 1985.

5.0 CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the potential for contaminant migration from these sites. The conclusions are based on the assessment of the information collected from the project team's field inspection, review of records and files, review of the environmental setting, and interviews with base personnel, past employees, and state and local government employees.

Six sites (five on SAFS and one on CPCA) were initially considered areas of concern with potential for contamination. Table 5.0-1 lists these sites and summarizes the evaluations of each site. Figs. 5.0-1 and 5.0-2 show the locations of the sites. Two of these sites were former stormwater drainage disposal sites that have little potential for residual contamination. One site (Site No. 2) is an operating stormwater drainage disposal site that may require an industrial discharge permit; therefore, this site was determined to warrant review and modification under the base environmental program. Three sites were fuel spill sites at which the cleanup operations were sufficient that little residual contamination remained. A sink drain disposal site (Site No. 6) on CPCA, while having a potential for residual contamination, does not present potential for migration or for endangerment of human health or environmental quality. This sink drain system was also determined to warrant review and modification under the base environmental program.

All six sites were evaluated using the decision process. Because the sites were found to have little or no potential for contamination or contaminant migration, none of the sites were evaluated using the HARM system.

Table 5.0-1. Summary of Information on Potential Contamination Sites on SAFS and CPCA

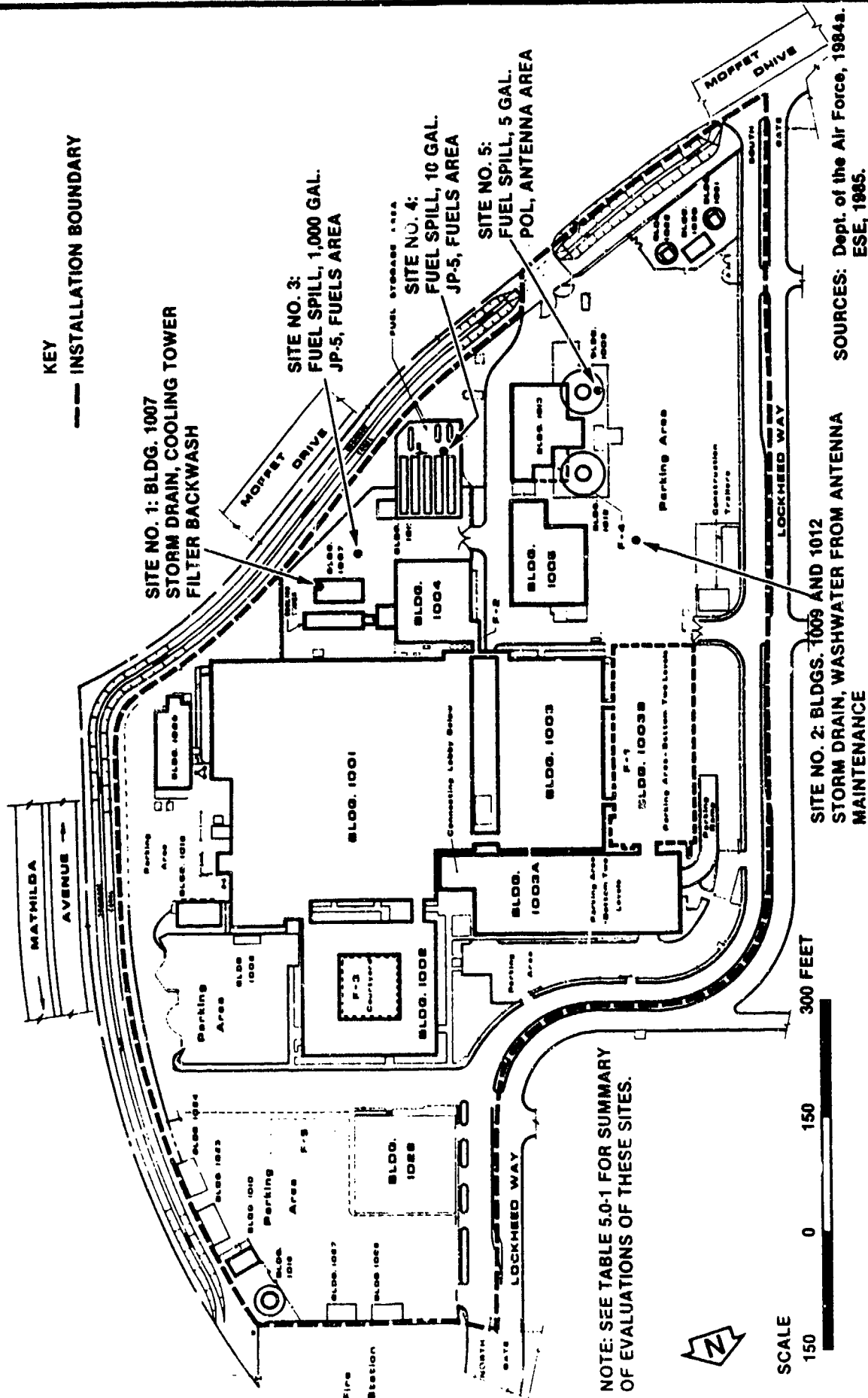
| Site * Number | Site Description | Report Designation | Dates of Oper- ation or Occurrence | Waste Description | Conclusions |
|------------------|---|-----------------------|---|---|---|
| 1 | Storm Drain, Bldg. 1007, Cooling Tower Filter | SD-1 | 1979-1982 | Filter backwash containing suspended solids | No potential for contami- nation; disposal practice ceased |
| 2 | Storm Drain, Bldgs. 1009 and 1012, Washwater from Antenna Maintenance | SD-2 | 1976-present | Washwater from antenna main- tenance containing an alka- line detergent-based air- craft-cleaning compound | No potential for residual contamination; refer to base environmental pro- gram for review of operation† |
| 3 | Fuel Spill, 1,000 gal JP-5, Fuels Area | FS-1 | March 1980 | 1,000 gal JP-5 | No potential for residual contamination; spill cleanup by SAFS |
| 4 | Fuel Spill, 10 gal JP-5, Fuels Area | FS-2 | 1983 | 10 gal JP-5 | No potential for residual contamination; spill cleanup by SAFS |
| 5 | Fuel Spill, 5 gal POL, Antenna Area | FS-3 | 1983 | 5 gal POL | No potential for residual contamination; spill cleanup by SAFS |
| 6 | CPCA Bldg. 2001, Wet Well Disposal Site | DS-1 | 1960-present | Wastewater from maintenance area sink drain; diluted small quantities of various chemicals used in mainten- ance operations | Potential for residual contamination; no poten- tial for migration or endangerment of human health or environment** |

*Site Nos. 1 through 5 located on SAFS (Fig. 5.0-1); Site No. 6 located on CPCA (Fig. 5.0-2).

†Subsequent to the site visit, it was reported that SAFS has applied to the California Regional Water Quality Control Board for a discharge permit.

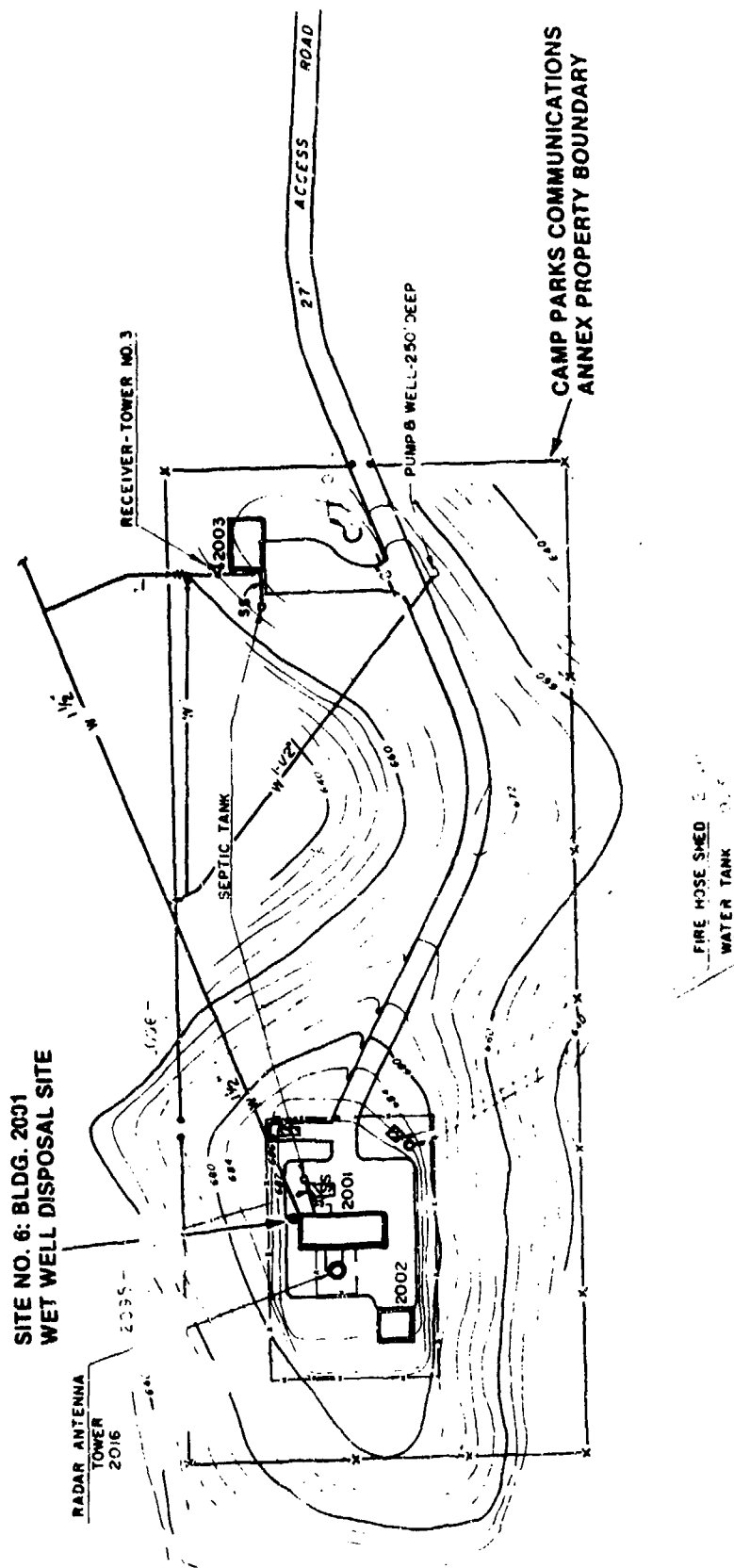
**Subsequent to the site visit, it was reported that preliminary plans are being developed to connect the wet well disposal system to the sanitary sewer disposal system.

Source: ESE, 1985.



INSTALLATION RESTORATION PROGRAM SUNNYVALE AIR FORCE STATION

Figure 5.0-1
LOCATIONS OF POTENTIAL CONTAMINANTS ON SAFS



NOTE: SEE TABLE 5.0-1 FOR SUMMARY EVALUATION OF SITE NO. 6.

SCALE
100 0 100 200 FEET

SOURCES: Dept. of the Air Force, 1984b.
ESE, 1985.

INSTALLATION RESTORATION PROGRAM SUNNYVALE AIR FORCE STATION

Figure 5.0-2
LOCATION OF POTENTIAL CONTAMINATION SITE ON
CAMP PARKS COMMUNICATIONS ANNEX

6.0 RECOMMENDATIONS

No sites on SAFS or CPCA were identified as having potential for contamination and contaminant migration; therefore, no Phase II actions are recommended. One operating stormwater drainage disposal site (Site No. 2) on SAFS and a sink drain disposal site (Site No. 6) on CPCA need to be reviewed by the base environmental program, and appropriate operational modifications should be made in accordance with state and Federal regulations. [Subsequent to the site visit, it was reported that SAFS has applied to the California Regional Water Quality Control Board for a discharge permit for Site No. 2 and that preliminary plans are being developed to connect the wet well disposal system (Site No. 6) at CPCA to the sanitary sewer disposal system.]

BIBLIOGRAPHY

BIBLIOGRAPHY

- Air Force Satellite Control Facility (AFSCF). 1982. AFSCF Historical Brief and Chronology. History Office. Sunnyvale AFS, CA. (SAFS-1).
- Air Force Satellite Control Facility (AFSCF). 1983. Statement of Work for Pest Control Services. Sunnyvale AFS, CA. (SAFS-20).
- Air Force Satellite Control Facility (AFSCF). 1984a. Tab "A" Narrative [Excerpts--Meteorology, Utilities]. Sunnyvale AFS, CA. (SAFS-15).
- Air Force Satellite Control Facility (AFSCF). 1984b. Fact Sheet--Welcome to Sunnyvale Air Force Station. Sunnyvale AFS, CA. (SAFS-17).
- Air Force Satellite Control Facility (AFSCF). 1984c. Pest Management Reports 1st Quarter FY 1981 Through 3rd Quarter FY 84. Sunnyvale AFS, CA. (SAFS-21).
- Air Force Systems Command (AFSC). 1984. Telephone Directory. Sunnyvale AFS, CA. (SAFS-5).
- Canonie Environmental Services. 1983. Subsurface Hydrogeologic Investigation, Mountain View Facility. Chesterton, IN. (SAFS-31).
- Canonie Environmental Services. 1984. Update of Subsurface Hydrogeologic Investigation, Mountain View Facility, Chesterton, IN. (SAFS-32).
- Department of the Air Force. 1970. Satellite Test Annex, Sunnyvale, CA, STC Building Addition, Soil Borings Plan and Logs. Los Angeles, CA. Dwg. No. CFD #B 91047. (SAFS-25).
- Department of the Air Force. 1984. Air Force Systems Command Comprehensive Plan. a. 1984--Base Plan - Tab C-1, Sheet 1 of 2; b. 1984--Water Supply, Sanitary Sewer and Storm Drainage Systems - Tab No. G-1, 2, 3, Sheets 1 & 2 of 2. Sunnyvale AFS, CA. Washington, D.C. (SAFS-8).
- Det. 3, HQ Air Weather Service. 1976. AFSCF Monthly Climatic Summary. Sunnyvale, CA. (SAFS-12).

- Helley, E.J. and Brabb, E.E. 1971. Geologic Map of Late Cenozoic Deposits, Santa Clara County, CA. U.S. Geological Survey, MF-335. (SAFS-38).
- National Climatic Data Center. 1983. Climatological Data: California--Annual Summary. Asheville, N.C. Vol. 87, No. 13. (SAFS-11).
- Naval Energy and Environmental Support Activity (NEESA). 1984. Initial Assessment Study of Naval Air Station, Moffett Field, Sunnyvale, California. NEESA 13-049. Port Hueneme, CA. (SAFS-42).
- Santa Clara Valley Water District. 1983. Lines of Equal Depth to Water as Measured in Wells, September-October 1983, Fall 1983, Santa Clara Valley. San Jose, CA. (SAFS-30).
- Secretary of the Army. 1972. Memorandum for Secretary of the Air Force Dated 28 June 1972, Subject: Transfer of a Portion of Camp Parks, CA, to the Department of the Air Force (Transfer Documents). (LAAFS-147).
- Sunnyvale Air Force Station (SAFS). 1969. Purchase Document for 8.197 Acres by the USAF from Lockheed Corp. Sunnyvale AFS, CA. (SAFS-39).
- Sunnyvale Air Force Station (SAFS). 1985. Camp Parks Annex Well Information. Civil Engineering Squadron. Sunnyvale AFS, CA. (SAFS-28).
- Sunnyvale Department of Public Safety. 1982. Hazardous Materials Survey. Fire Prevention Bureau, Sunnyvale, CA.
- U.S. Army Corps of Engineers. 1981. Preliminary Draft Environmental Impact Statement for the Reactivation and Development Plans, Parks Reserve Forces Training Area, Alameda and Contra Costa Counties, Calif. San Francisco District.
- U.S. Army Environmental Hygiene Agency (USAEHA). 1978. Summary of U.S. Army Drinking Water Surveillance Program, Data Base 1972-1977. Aberdeen Proving Ground, MD.
- U.S. Department of Commerce. 1961. Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years. Technical Paper No. 40. Washington, DC.
- U.S. Department of Commerce. 1968. Climatic Atlas of the United States. Environmental Sciences Services Administration, Environmental Data Service. Washington, DC.

U.S. Environmental Protection Agency (EPA). 1984a. National Interim Primary Drinking Water Regulations. Code of Federal Regulations, Title 40, Part 141.

U.S. Environmental Protection Agency (EPA). 1984b. National Secondary Drinking Water Regulations, Secondary Maximum Contaminant Levels. Code of Federal Regulations, Title 40, Part 143.3.

APPENDIX A
GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

APPENDIX A
GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

| | |
|---------------|--|
| AFB | Air Force Base |
| AFBMD | Air Force Ballistic Missile Division |
| AFSC | Air Force Systems Command |
| AFSCF | Air Force Satellite Control Facility |
| AMC | Air Materiel Command |
| Aquifer | A geologic formation, group of formations, or part of a formation capable of yielding water to a well or spring |
| ARDC | Air Research and Development Command |
| ARPA | Advanced Research Projects Agency |
| AVS | Audio Visual Squadron |
| BEE | Bioenvironmental Engineering |
| BSD | Ballistics Systems Division |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| Contamination | Degradation of natural water quality to the extent that its usefulness is impaired; degree of permissible contamination depends on intended use of water |
| CPCA | Camp Parks Communications Annex |
| DCA | Defense Communications Agency |
| DEQPPM | Defense Environmental Quality Program Policy Memorandum |
| Det. | Detachment |

| | |
|-----------------------------|---|
| Disposal of hazardous waste | Discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste, or any constituent thereof, may enter the environment, be emitted into the air, or be discharged into any waters, including ground water |
| DOD | Department of Defense |
| Downgradient | In the direction of decreasing hydraulic static head; the direction in which ground water flows |
| DPDO | Defense Property Disposal Office |
| Effluent | Liquid waste discharged in its natural state or partially or completely treated, from a manufacturing or treatment process |
| EPA | U.S. Environmental Protection Agency |
| ESE | Environmental Science and Engineering, Inc. |
| FMA | Fort MacArthur |
| ft | feet |
| ft ² | square feet |
| FTU | Formazin turbidity units |
| gal | gallon(s) |
| gal/yr | gallon(s) per year |
| gpd | gallon(s) per day |
| Ground water | Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure |
| HARM | Hazard Assessment Rating Methodology |
| Hazardous waste | As defined in RCRA, a solid waste or combination of solid wastes which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed |

| | |
|--------------|--|
| HQ | Headquarters |
| ICBM | Intercontinental ballistic missile |
| Infiltration | Movement of water through the soil surface into the ground |
| IOC | Initial operating capability |
| IRBM | Intermediate-range ballistic missile |
| IRP | Installation Restoration Program |
| JP | Jet propellant |
| LAAFS | Los Angeles Air Force Station |
| lb | pound(s) |
| LMSC | Lockheed Missile and Space Company |
| MCL | Maximum contaminant level |
| MEK | Methyl ethyl ketone |
| mg/l | milligram(s) per liter |
| MIT | Massachusetts Institute of Technology |
| MSL | Mean sea level |
| NA | Not applicable |
| NASA | National Aeronautics and Space Administration |
| NAS | Naval Air Station |
| NCOIC | Noncommissioned Officer-in-Charge |
| NEESA | Naval Energy and Environmental Support Activity |
| NIPDWR | National Interim Primary Drinking Water Regulations |
| NSDWR | National Secondary Drinking Water Regulations |
| OL | Operating Location |
| PCB | Polychlorinated biphenyl--liquid used as a dielectric in electrical equipment; suspected human carcinogen; bioaccumulates in the food chain and causes toxicity to higher trophic levels |

| | |
|--------------|--|
| pCi/l | picocurie(s) per liter |
| Permeability | The capacity of a porous rock, soil, or sediment of transmitting a fluid without damage to the structure of the medium |
| POL | Petroleum, oils, and lubricants |
| PRFTA | Parks Reserve Forces Training Area |
| PSF | Presidio of San Francisco |
| PVC | Polyvinyl chloride plastic |
| RCRA | Resource Conservation and Recovery Act |
| SAC | Strategic Air Command |
| SAFS | Sunnyvale Air Force Station |
| SAMSO | Space and Missile Systems Organization |
| SATCOM | Satellite Communications |
| SD | Space Division |
| SSD | Space Systems Division |
| STA | Satellite Test Annex |
| STC | Satellite Test Center |
| STORET | Storage and retrieval |
| STS | Space Transportation System |
| TDS | Total dissolved solids |
| UCMJ | Uniform Code of Military Justice |
| umhos/cm | micromhos per centimeter |
| Upgradient | In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of ground water |
| USAF | U.S. Air Force |
| Water table | Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere |

| | |
|-----------------|------------------------------|
| WDD | Western Development Division |
| WS | Weapon system |
| yd ³ | cubic yard(s) |

APPENDIX B
TEAM MEMBER BIOGRAPHICAL DATA

ESE

PROFESSIONAL RESUME

CHARLES D. HENDRY, JR., Ph.D.
Staff Chemist

SPECIALIZATION

Water Quality Chemistry, Atmospheric Chemistry, Physical-Chemical
Transport of Toxic/Hazardous Substances, Environmental Fate of Toxic
Substances

RECENT EXPERIENCE

Toxic/Hazardous Materials, Handling and Disposal, USATHAMA and NEESA,
Project Manager--Assessment of present and past handling and disposal
practices for toxic/hazardous materials on 32 U.S. Army and Navy
installations conducted for USATHAMA and NEESA. These sites include
seven installations in the southeastern United States. Includes
evaluation of the potential for off-post migration of toxic materials,
recommendations for sampling and analysis, and compliance with
existing federal and state regulations.

Toxic Substances--Fate in the Environment, U.S. Environmental
Protection Agency, Subproject Manager--Assessment of the release
transport and fate of toxic organic and inorganic substances in the
environment. This assessment is based upon physical and chemical
properties (e.g., volatility, solubility, photolysis, hydrolysis,
sorption, and biodegradation) of the compounds and evaluation of
predicted environmental concentrations using computer models.

Toxic/Hazardous Materials Sampling and Analysis-Quality Assurance/
Control--Analytical chemistry QA/QC for project involving sampling and
analysis of soils, waters, and biota at a U.S. Army ammunition
manufacturing plant, Alabama Army Ammunitions Plant, Alabama.

Florida Power Coordinating Group, Atmospheric Deposition Study,
Technical Consultant--Three-year study measuring deposition of
chemical substances by atmospheric precipitation. Includes
monitoring, source attribution studies, and ecological effects
evaluation. Emphasis placed upon water quality impacts.

EDUCATION

| | | | |
|-------|------|---------------------------|-----------------------|
| Ph.D. | 1983 | Environmental Engineering | University of Florida |
| M. S. | 1977 | Environmental Engineering | University of Florida |
| B. S. | 1974 | Chemistry | University of Florida |

ASSOCIATIONS

American Chemical Society
Water Pollution Control Federation
Air Pollution Control Association

RECENT REPORTS

Approximately 35 hazardous waste site investigations of U.S. military
installations.

PUBLICATIONS

Approximately 15 publications related to transport and transformation
of pollutants in the atmosphere and the aquatic environment.

ESE

PROFESSIONAL RESUME

ALLEN P. HUARD, B.S.E.
Department Manager, Remedial Engineering

SPECIALIZATION

Hazardous Waste Management, Remedial Actions, Industrial Waste
Operations Design and Permitting

RECENT EXPERIENCE

Design and Implementation of Remedial Actions for Petroleum Product Spill in a Stormwater Detention Basin, Project Manager--Manager for site investigations, alternatives evaluation, engineering design, and confirmation of decontamination. Project involved a site at which an undetermined large volume of petroleum products had been spilled into a stormwater collection system over a period of 10 to 15 years. Site was decontaminated and restored to FDER specifications.

Superfund Site Remedial Action Feasibility Study, Sapp Battery Site, Florida, Project Engineer--Under contract to Florida Department of Environmental Regulation (DER), ESE is evaluating potential remedial actions for this former industrial facility contaminated with lead and sulfuric acid from past battery reclamation operations. Project engineers are responsible for development of initial and long-term remedial measures for eliminating actual and potential contaminant migration with cost and liability as primary factors.

Project Manager/Engineer Hazardous Waste Delisting Projects, Project Manager--Four separate projects for three plants in the steel finishing industry. Projects included negotiation with state and federal agencies (in different states), sampling and analysis, and formal petition documents to exclude listed hazardous wastes from RCRA regulation according to 40 CFR Part 260.22.

Hazardous Waste Inventory and Delisting, Carolina Galvanizing Corporation (CGC), Aberdeen, North Carolina, Project Manager--Developed sampling and analysis plan after evaluating plant processes and regulatory requirements specific to CGC. Sludge analyses demonstrated that the generated sludge met delisting criteria. Delisting petition prepared for EPA Region IV and the North Carolina Department of Human Resources (DHR). Also performed a hydrogeologic survey to demonstrate that sludge could be deposited in an onsite landfill, which was later designed and permitted. Responsibilities included supervising sampling, negotiation with regulatory agencies and clients, preparing and overseeing fixation studies, and evaluating all reports.

Project Manager/Engineer RCRA Closure Plans for Hazardous Waste Treatment and Storage Facilities, Project Manager--Developed plans for five separate clients for closure of hazardous waste treatment, storage, disposal facilities (TSDFs). Types of operations included hazardous waste incinerator, burning ground, and storage tank farm, chemical/physical treatment system, land treatment facility, surface impoundments. Final plans complied with 40 CFR Part 265.

Industrial Wastewater Permit for Coal-Slag Reclamation Facility, Mineral Aggregates, Inc. (Lonestar Minerals), Tampa, Florida, Project Engineer—Prepared engineering report for permit application involving reuse of bottom slag from a coal-fired power plant. Client recycles the slag as sandblasting grit, roofing material, and other products. Runoff from slag piles enters Tampa Bay, necessitating a mixing zone as part of the permit.

Hazardous Waste Remedial Action/Decontamination Study, Alabama Army Ammunition Plant, Project Engineer—Project to develop and implement corrective measures for decontamination of buildings, process equipment, sewers and soil to control surface water and ground water contamination at U.S. Army ammunition plant. Developed decontamination alternatives with consideration of risk, cost and technical feasibility.

Industrial Wastewater Treatment/Disposal System Design and Permitting Projects, Project Manager, Project Engineer—Seven permitting projects for industrial clients in various SIC codes (two metal finishing, two food and beverage, one aircraft maintenance, and two cement products). These industrial permitting projects involved conceptual and final design, waste characterization, report preparation, extensive negotiation with regulatory agencies, and interaction with legal counsel for some clients.

Expert Witness Testimony for Industrial Clients, Ardmore Farms and Martin Electronics, Inc., Florida—Testimony helped the clients with a lawsuit and regulatory action to avoid costly penalties.

Preparation of RCRA Part B Permit Applications, Project Engineer—Responsible for various engineering aspects of Part B applications for five industrial clients. Facilities included storage tanks, chemical/physical treatment operations, and land disposal. Permitting involved both federal and state criteria.

Hazardous Waste Landfill Siting Study, Allied Chemical Company, Project Engineer—Evaluation of six existing commercial hazardous waste disposal sites, including development of corrective construction requirements and RCRA compliance measures required. This study included location of potential sites for a hazardous waste landfill using RCRA siting criteria.

A.P. HUBBARD, B.S.E.

Page 3

Industrial/Hazardous Waste Characterization and Evaluation, Project Engineer—Evaluation of existing and proposed industrial and hazardous waste treatment storage and disposal facilities at three industrial free zones in Egypt. Project included a characterization of wastes using RCRA regulations.

EDUCATION

B.S.E. 1979 Environmental Engineering University of Florida

REGISTRATION

P.E. Florida 1984

ASSOCIATION

American Society of Civil Engineers

JEFFREY J. KOSIK, B.S.E.
Associate Engineer

ESE PROFESSIONAL RESUME

SPECIALIZATION

Hazardous Waste Management, Water and Wastewater Treatment, Water
Supply and Field of Investigations

RECENT EXPERIENCE

Initial Assessment Studies for the United States Air Force, Team Engineer--Comprehensive studies at 2 Air Force bases to determine both past and present history with regard to the use and disposal of toxic and hazardous materials. Conducted in accordance with the Department of Defense Installation Restoration Program policies.

Reassessment for Hazardous Wastes at Army Installation, Team Engineer--Comprehensive study at an Army installation to determine both past and present history with respect to the use of hazardous substances, quantities used, disposal methods and disposal sites. Also includes a current assessment of safety practices and compliance with regulations.

Hazardous Waste Survey and Assessment and Review of Potential Liability for a Major U.S. Industrial Corporation, Project Engineer--Comprehensive survey of over 50 corporate facilities to determine past and present activities with respect to the use of hazardous substances, quantities used, disposal methods, disposal sites and potential legal liability of those activities. Study also includes an assessment of compliance with regulations.

Industrial Wastewater Treatment/Disposal Systems Design and Permitting, Project Engineer--Several projects for the conceptual and final design of a treatment/disposal system, design of treatment instrumentation systems, and permitting.

Effluent Guidelines Development for the Pharmaceuticals Manufacturing Point Source Category, Project Engineer--Comprehensive study for wastewater characterization, treatment system performance evaluation, and estimation of installation and operating costs for treatment systems to remove toxic and conventional pollutants.

EDUCATION

B.S.E. 1982 Environmental Engineering University of Florida
1984 Hazardous Materials/Site Investigations Training Course

AFFILIATIONS

Society of Environmental Engineers
American Water Works Association
Water Pollution Control Federation
Boy Scouts of America
American Red Cross

DONALD F. McNEILL, M.S.
Associate Scientist

ESE PROFESSIONAL RESUME

SPECIALIZATION

Hydrogeology, Ground Water Monitoring and Evaluation, Clastic Sedimentology, Carbonate Sedimentology, Peat and Organic Sediment Analysis, Geomorphology, Stratigraphy, Field Mapping, and Sampling Techniques

RECENT EXPERIENCE

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of Ft. Riley, Kansas.
Geohydrologic assessment of present and past waste disposal methods, responsible for evaluation of the potential for migration of contaminants in the subsurface.

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of Military District of Washington. Geohydrologic assessment of present and past waste disposal methods, responsible for evaluation of the potential for migration of contaminants in the subsurface.

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of West Virginia Ordnance Works.
Geologic and ground water investigation of past waste disposal methods. Responsible for evaluation of ground water contamination and off-post contaminants migration.

Florida Department of Environmental Regulation, Site Contamination Assessment, Project Hydrogeologist--Investigated organic and inorganic contamination at City Chemical Company, Orlando, Florida.
Assessment of shallow aquifer with respect to contaminant migration.

EDB Contamination Investigation, Project Hydrogeologist--Investigated EDB contamination of drinking water wells at Sanford, Florida, including drilling and field sampling, installation of piezometers, measuring water levels and sampling wells, evaluating alternatives, and preparing report.

Adcom Wire Company, Project Hydrogeologist--Development of a ground water monitoring plan for a wire galvanizing plant including site analysis, geohydrology, and proposed ground water monitoring network.

Orange County, Project Hydrogeologist--Development of a ground water monitoring plan for a sanitary landfill near Orange, Florida.
Project consisted of monitor well installation, measuring water levels, geohydrologic evaluation and report preparation.

D.F. McNeill

Page 2

U.S. Air Force Installation Restoration Program, Project Geologist--Installation assessment of Columbus, Andersen, and Vandenburg Air Force Bases. Responsible for geohydrologic evaluation of sanitary and solid waste disposal areas, and the potential for off-post migration.

Minerals Management Service, Project Geologist--Responsible for sediment core and sediment trap analysis for evaluation of sediment transport in selected areas of the Gulf of Mexico.

University of Florida, Research Associate--Texaco U.S.A.- funded research grant involving the development of a method of increasing BTU values in autochthonous mineral-rich peats and organic sediments.

Department of Energy and Governor's Energy Office, State of Florida, Research Assistant--Florida fuel grade peat assessment program conducted through the University of Florida; involved sampling, mapping, and analysis of Florida fuel peat resources.

EDUCATION

| | | | |
|------|------|---------|------------------------------|
| M.S. | 1983 | Geology | University of Florida |
| B.S. | 1981 | Geology | State University of New York |

AFFILIATIONS

American Association of Petroleum Geologists--Energy Minerals Division
Geological Society of America
Southeastern Geological Society
Society of Economic Paleontologists and Mineralogists

APPENDIX C
LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

APPENDIX C
LIST OF INTERVIEWEES

| Interviewee | Years of Service at SAFS |
|--|--------------------------------|
| 1. Chief of Programs and Operations | 13 |
| 2. Manager, Power Plant | 14 |
| 3. Manager, Power Plant Maintenance | 5 |
| 4. Power Plant Safety Officer | 3 |
| 5. Noncommissioned Officer-In-Charge (NCOIC), Superintendent of STC Maintenance | 1 |
| 6. NCOIC, Chief of Maintenance, 1999th Communications Squadron | 2 |
| 7. Base Historian | 1 |
| 8. Arms and Equipment Custodian, 6594th ABG | 1 |
| 9. Chief of Safety | 0.3 |
| 10. Director of Civil Engineering | 2 |
| 11. NCOIC, Reprographics | 3 |
| 12. Environmental Coordinator | |
| 13. Facility Contractor/Mechanical Engineer | 9 |
| 14. Bioenvironmental Engineer, Travis AFB, Calif. | 1 |
| 15. Lead Earth Station Technician, RCA | 3 |
| 16. Data Link Terminal Supervisor, Ford Aerospace and Communications Corp. | 3 |
| 17. CPCA Station Manager, Lockheed | 23 |
| 18. Fire Protection Technician, AMEX | 12 |
| 19. Facility Contract Manager, AMEX Systems, Inc. | 15 |

| <u>Interviewee</u> | <u>Years of Service at SAFS</u> |
|---|---|
| 20. Chief Engineer, AMEX Systems, Inc. | 15 |
| 21. Painter, AMEX Systems, Inc. | 11 |
| 22. Painter, AMEX Systems, Inc. | 9 |
| 23. Groundskeeper, AMEX Systems, Inc. | 5 |
| 24. Carpenter, AMEX Systems, Inc. | 10 |
| 25. Air Conditioning Technician, AMEX Systems, Inc. | 10 |
| 26. Materials Section Manager, AMEX Systems, Inc. | 12 |
| 27. Mechanical and Machine Shop, AMEX Systems, Inc. | 10 |
| 28. Superintendent of Maintenance, AMEX Systems, Inc. | 28 |

APPENDIX C
OUTSIDE AGENCY CONTACTS

1. Tom Burkens
State of California
California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, CA 94607
2. Don Eisenberg
State of California
California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, CA 94607
3. Bob Peterson
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118
408/265-2600
4. Donald Firth
Water Conservation Division
City of Sunnyvale
Sunnyvale, CA 94039
408/738-5665
5. California Division of Mines and Geology, Sacramento, CA
6. Albert F. Simpson Historical Research Center, Maxwell AFB, AL
7. U.S. Geological Survey, Alexandria, VA, and Denver, CO
8. California Dept. of Fish and Game, Sacramento, CA
9. Santa Clara Valley Water District, San Jose, CA
10. DOD Explosives Safety Board, Alexandria, VA

APPENDIX D
ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES

APPENDIX D
ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES

PRIMARY ORGANIZATIONS

HEADQUARTERS, AIR FORCE SATELLITE CONTROL FACILITY

The primary mission of AFSCF is to acquire, maintain, and operate a common-user spacecraft support network for DOD. AFSCF provides capability for simultaneous command and control of large numbers of military spacecraft through its worldwide network of satellite tracking and commanding stations. Tracking stations have been strategically located to (1) support equatorial launches from the Eastern Space and Missile Center, (2) support polar launches from the Western Space and Missile Center, (3) continuously support satellites in a variety of orbiters, and (4) support low-altitude satellites during their daily earth revolutions.

6594TH AIR BASE SQUADRON

The 6594th Air Base Squadron provides administrative, security, civil engineering, and chaplain support to personnel of HQ AFSCF and CPCA. The Commander, 6594th Air Base Squadron, exercises summary court-martial jurisdiction, including authority under Article 15, Uniform Code of Military Justice (UCMJ) over all military personnel assigned or attached to HQ SD (AFSC) and its subordinate organizations located at SAFS. Generally, the Commander, 6594th Air Base Squadron, also exercises summary court-martial jurisdiction and authority under Article 15 UCMJ over all military personnel assigned or attached to tenant units at SAFS.

TENANT ORGANIZATION

1999TH COMMUNICATIONS SQUADRON

The 1999th Communications Squadron is organized into three major areas: operations, maintenance, and the orderly room. The operations division

is comprised of the Technical Control Workcenter, the communications center in support of the Air Force Special Security Office, and the Defense Satellite Communication System Phase III Operations Center. Due to the complexity and variety of the communications system, the Chief of Maintenance and the Work Center employ the services of an Air Force Engineering and Technical Services Representative who provides formal training for all satellite communications specialists in the squadron. The administrative section supports all administration needs for the entire squadron.

APPENDIX E
MASTER LIST OF SHOPS AND LABS

APPENDIX E
MASTER LIST OF SHOPS AND LABS

| Shop Name | Location | Handles Hazardous Materials | Generates Hazardous Wastes | Typical Treatment, Storage, and Disposal Method |
|--|-----------|-----------------------------------|----------------------------------|--|
| <u>SUNNYVALE AFS</u> | | | | |
| <u>Civil Engineering</u> | | | | |
| Power Plant Maintenance | 1004,1007 | Yes | Yes | Contract disposal |
| POL Area | 1011 | No | Yes | Contract disposal |
| Cooling System | 1007 | No | No | |
| Paint Shop | 1001 | Yes | Yes | Contract disposal |
| Facilities Engineering | 1002 | No | No | |
| <u>6549th Air Base Squadron</u> | | | | |
| Security Police | 1028 | Yes | Yes | Contract disposal |
| Reprographics | 1001 | Yes | Yes | Contract disposal |
| <u>1999th Communications Squadron</u> | | | | |
| Antenna Maintenance | 1012,1004 | No | Yes | Contract disposal |
| <u>Contractor</u> | | | | |
| Ford Aerospace Data Link Terminal | 1016 | No | Yes | Given to Ford employee for offbase use |
| <u>CAMP PARKS COMMUNICATIONS ANNEX</u> | | | | |
| Equipment Maintenance | 2001 | Yes | Yes | Evap rated from parking area |

APPENDIX F
WATER QUALITY DATA

HETCH-HETCHY WATER SUPPLY

QUALITY OF WATER (LATEST/MOST COMPLETE ANALYSIS) (RECEIVED JUNE 1984)

Source(s)
(Surface, Ground, Public,
Catchments, or Sea)

Raw Water *

Finished Water *

Parameters (Primary)

| mg/l | |
|-------------------------------|----------|
| Arsenic | < 0.005 |
| Barium | < 0.5 |
| Cadmium | < 0.001 |
| Chromium | < 0.001 |
| Fluoride | < 0.01 |
| Lead | < 0.0005 |
| Mercury | < 1.0 |
| Nitrates (as N) | < 0.0005 |
| Selenium | N.D.* |
| Silver | N.D. |
| Endrin | N.D. |
| Lindane | N.D. |
| Methoxychlor | N.D. |
| Toxaphene | N.D. |
| 2,4-D | N.D. |
| 2,4,5-TP Silvex | N.D. |
| Trihalomethanes | N.D. |
| Turbidity, N.T.U. | 0.6 |
| Radium (RA226 & RA228) | *** |
| Gross Alpha Particle Activity | *** |
| Microbiological. | *** |
| bacteria/100 ml | |

Parameters (Secondary)

| mg/l | |
|---------------------------------|---------|
| Chloride | 3 |
| Copper | 0.001 |
| Foaming Agents | *** |
| Iron | 0.066 |
| Manganese | 0.002 |
| Sodium | 1.9 |
| Sulfate | < 1.0 |
| Total Dissolved Solids | 28 |
| Zinc | < 0.001 |
| Color, units | 0 |
| Corrosivity | *** |
| Odor (Threshold Odor Number) | *** |
| PH | 0.6 |

Priority Pollutants (If performed)

- * Hetch-Hetchy storage reservoir water requires little treatment
- ** Not detectable at minimum quantitation limit
- *** Not measured

Atch 1a

CURRENTLY SUNNYVALE IS
SERVED 90% ALAMEDA EAST
10% SAN ANTONIO
0% CALAVERAS

SAN FRANCISCO WATER DEPARTMENT
WATER QUALITY DIVISION
ANNUAL MINERAL ANALYSIS

(INVERTED)
20-0%
10-2%
(FLUORIDE)

| Source | A Primary Drinking Hatch Hatchery Water Standard MCL (mg/l) | B Alameda East Peral (Treated) July 26, 1963 | C Calaveras (Surface) July 25, 1963 | D San Antonio (Surface) July 25, 1963 | E Crystal Springs Reservoir (Surface) July 25, 1963 | F San Antonio Reservoir (Surface) July 25, 1963 | G Marathon Reservoir (Surface) July 25, 1963 | H Stone Dam Reservoir (Surface) July 25, 1963 | I Lakes Reservoir (Surface) July 25, 1963 | J Sausal Reservoir Cellular July 26, 1963 | K Mission Well Field 0-1 July 26, 1963 | L Cherry Reservoir (Surface) July 27, 1963 |
|---|--|--|--|--|---|---|---|---|--|--|---|--|
| Chemical Constituents | | | | | | | | | | | | |
| Calcium (+) (mg/l) | | 0.08 | 0.04 | 0.04 | 0.07 | 0.05 | 0.03 | 0.04 | 0.08 | 0.09 | 0.09 | 0.03 |
| Aluminum | (0.05) | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Artenic | (1) | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Boron | | 0.08 | 0.15 | 0.15 | 0.20 | 0.15 | 0.05 | 0.09 | 0.20 | 0.45 | 0.36 | 0.07 |
| Cadmium | (0.01) | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Calcium | | 0.47 | 16.9 | 18.3 | 16.5 | 15.0 | 10.6 | 16.7 | 24.9 | 44.8 | 54.5 | 0 |
| Chlorine | (0.05) | <0.001 | 0.001 | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | 0.001 | 0.001 | 0.001 | <0.001 |
| Copper | | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 |
| Iron | (0.05) | 0.046 | 0.004 | 0.004 | 0.042 | 0.149 | 0.040 | 0.144 | 0.039 | 0.007 | 0.008 | 0.019 |
| Lead | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.002 | <0.001 | <0.001 |
| Magnesium | | 0.27 | 7.8 | 9.8 | 8.4 | 7.3 | 3.6 | 6.1 | 25.1 | 19.4 | 14.9 | 0.13 |
| Manganese | | 0.001 | <0.001 | <0.001 | <0.001 | 0.004 | 0.002 | 0.002 | 0.002 | <0.001 | <0.001 | <0.001 |
| Mercury | (0.002) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Potassium | | 0.2 | 1.4 | 1.7 | 1.2 | 1.0 | 0.4 | 0.7 | 1.9 | 1.7 | 0.2 | 0.2 |
| Selenium | (0.01) | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Silver | (0.05) | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Sodium | | 1.3 | 10.4 | 15.4 | 11.2 | 11.5 | 13.2 | 15.5 | 43.2 | 21.4 | 31.5 | 1.3 |
| Zinc | | 0.001 | <0.001 | <0.001 | 0.001 | 0.001 | 0.001 | <0.001 | 0.001 | 0.233 | 0.002 | 0.001 |
| Anions (-) (mg/l) | | | | | | | | | | | | |
| Bicarbonate | | 14.4 | 110 | 112 | 77 | 71 | 55 | 95 | 141 | 700 | 281 | 4.5 |
| Chloride | | 2.0 | 2.6 | 2.1 | 0.8 | 0 | 0 | 0 | 2.0 | 0 | 0 | 0 |
| Fluoride | (1.4-2.4) | <0.01 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | <0.01 |
| Nitrate | (45) | <0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nitrite | | <0.0 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.9 | 2.4 | 10.2 | 10.6 | <0.0 |
| Phosphate | | <0.05 | <0.02 | <0.02 | 0.006 | 0.009 | <0.002 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Sulfate | | <0.0 | 14.0 | 24.0 | 18.5 | 12.0 | 7.1 | 9.8 | 21.5 | 70.0 | 57.0 | <0.0 |
| Nitrites (mg/l) | | | | | | | | | | | | |
| NBAS | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Free Ammonia (NH ₃) | | <0.05 | <0.05 | 0.05 | 0.10 | 0.05 | 0.05 | 0.10 | 0.05 | <0.05 | <0.05 | <0.05 |
| Dissolved Oxygen (O ₂) | | 10.4 | 8.5 | 8.2 | 8.9 | 9.2 | 8.9 | 9.4 | 8.5 | 8.4 | 8.4 | 8.9 |
| Silica (SiO ₂) | | 2.0 | 9.7 | 5.5 | 9.0 | 7.5 | 14.5 | 16.5 | 21.8 | 14.2 | 18.5 | 2.6 |
| Derived Values (mg/l) | | | | | | | | | | | | |
| Hardness as CaCO ₃ | | 2.0 | 104 | 114 | 88 | 76 | 50 | 90 | 170 | 226 | 318 | 2.0 |
| Alkalinity as CaCO ₃ | | 4.0 | 170 | 104 | 70 | 66 | 50 | 84 | 154 | 176 | 250 | 4.0 |
| Total Dissolved Solids at 103° C - 105° C | | 8 | 150 | 176 | 128 | 125 | 101 | 147 | 328 | 372 | 481 | 8 |
| Physical Measurements | | | | | | | | | | | | |
| Conductivity (umhos/cm) | | 9 | 255 | 294 | 230 | 209 | 161 | 249 | 540 | 555 | 745 | 9.0 |
| pH | | 6.5 | 7.6 | 8.6 | 8.3 | 8.2 | 7.8 | 7.6 | 8.3 | 7.3 | 7.6 | 6.4 |
| Turbidity (NTU) | (1) | 0.2 | 0.6 | 1.0 | 0.8 | 1.7 | 0.5 | 1.2 | 3.4 | 0.4 | 0.05 | 0.2 |
| Color (Units) | | 0 | 5 | 18 | 20 | 15 | 15 | 15 | 20 | 0 | 0 | 0 |

* Fluoride - Water served to the City of San Mateo north to and including San Francisco are fluoridated to 1.0 mg/l
** Range between pH 7.6 - 9.5 due to lime treatment

* ALAMEDA EAST PARTIAL WATER
IF HATCH-HATCHERY WATER WITH
LIME AND CHLORINE ADDED

McKESSON ENVIRONMENTAL SERVICES
PRIORITY POLLUTANT ANALYSIS

7072-ES(99)

LAB I.D. 11583
SAMPLE I.D. ANEX (Sample of 1/10/84)
DATE RECEIVED 1/16/84
DATE ANALYZED 1/17/84

McIntosh Laboratories
SML/18029

| <u>VOLATILES</u> | <u>ug/L</u> | <u>OTHER COMPOUNDS FOUND</u> | <u>CONCENTRATION</u> |
|--------------------------------|-------------|----------------------------------|----------------------|
| benzene | ND | | |
| bromodichloromethane | ND | | |
| bromoform | ND | | |
| bromomethane | ND | | |
| carbon tetrachloride | ND | | |
| chlorobenzene | ND | | |
| chloroethane | ND | | |
| 1-chloroethylvinyl ether | ND | | |
| chloroform | ND | | |
| chloromethane | ND | | |
| dibromochloromethane | ND | | |
| 1,2-and/or 1,4-dichlorobenzene | ND | | |
| 1,3-dichlorobenzene | ND | | |
| 1,1-dichloroethane | ND | | |
| 1,2-dichloroethane | ND | | |
| 1,1-dichloroethene | ND | | |
| trans-1,2-dichloroethene | * | | |
| 1,2-dichloropropane | ND | | |
| cis-1,3-dichloropropene | ND | | |
| trans-1,3-dichloropropene | ND | | |
| ethyl benzene | ND | | |
| methylene chloride | ND | | |
| 1,1,2,2-tetrachloroethane | ND | | |
| tetrachloroethene | ND | | |
| toluene | ND | | |
| 1,1,1-trichloroethane | ND | | |
| 1,1,2-trichloroethane | ND | | |
| trichloroethene | ND | | |
| vinyl chloride | ND | | |

N. W. Flynn
N. W. Flynn, Laboratory Manager

Detection Limits: 2-10 ug/L

ND = Not Detected

* = Compound detected; concentra-
tion below level for accurat
quantitation

** = Estimated value; compound
saturated detector

APPENDIX G

USAF IRP HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

"develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEOPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH₂M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH₂M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

FIGURE 1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

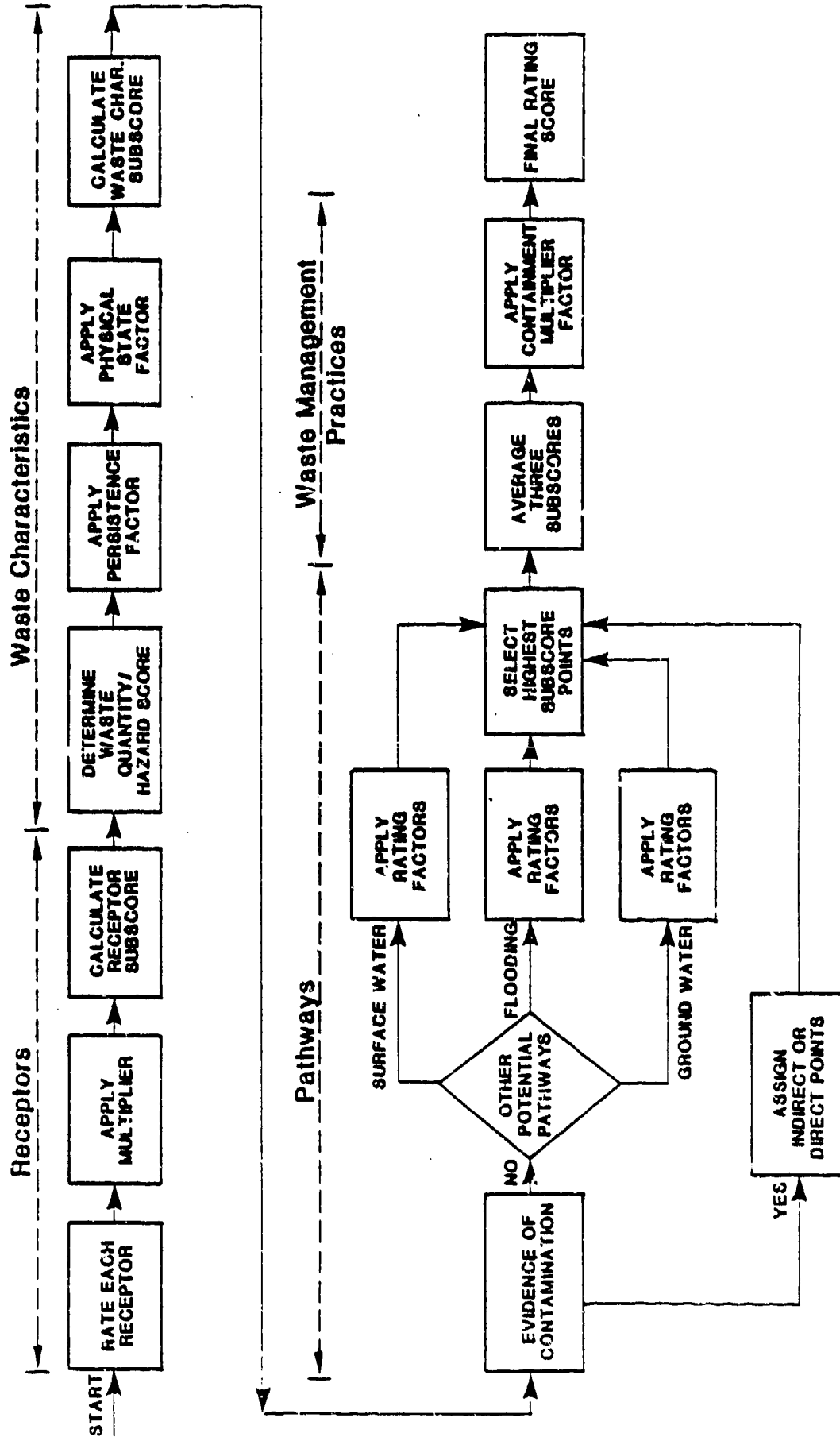


FIGURE 2
HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

NAME OF SITE _____
 LOCATION _____
 DATE OF OPERATION OR OCCURRENCE _____
 OWNER/OPERATOR _____
 COMMENTS/DESCRIPTION _____
 SITE RATED BY _____

I. RECEPTORS

| Rating Factor | Factor Rating (0-3) | Multiplier | Factor Score | Maximum Possible Score |
|--|---------------------|------------|--------------|------------------------|
| A. Population within 1,000 feet of site | | 4 | | |
| B. Distance to nearest well | | 10 | | |
| C. Land use/zoning within 1 mile radius | | 3 | | |
| D. Distance to reservation boundary | | 6 | | |
| E. Critical environments within 1 mile radius of site | | 10 | | |
| F. Water quality of nearest surface water body | | 6 | | |
| G. Ground water use of uppermost aquifer | | 9 | | |
| H. Population served by surface water supply within 3 miles downstream of site | | 4 | | |
| I. Population served by ground-water supply within 3 miles of site | | 6 | | |

Subtotals _____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

- A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

- B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

| | | | | |
|-----------------------------------|--|---|--|--|
| Distance to nearest surface water | | 8 | | |
| Net precipitation | | 6 | | |
| Surface erosion | | 8 | | |
| Surface permeability | | 6 | | |
| Rainfall intensity | | 8 | | |

Subtotals _____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

2. Flooding

Subscore (100 x factor score/3) _____

3. Ground-water migration

| | | | | |
|-------------------------------|--|---|--|--|
| Depth to ground water | | 8 | | |
| Net precipitation | | 6 | | |
| Soil permeability | | 8 | | |
| Subsurface flows | | 8 | | |
| Direct access to ground water | | 8 | | |

Subtotals _____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
 Waste Characteristics _____
 Pathways _____

Total _____ divided by 3 = _____
 Gross Total Score

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = _____

TABLE 1
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

| I. RECEPTORS CATEGORY | | Rating Scale Levels | | | | Multiplier |
|-----------------------|---|--|--|---|---|------------|
| Rating Factors | | 0 | 1 | 2 | 3 | |
| A. | Population within 1,000 feet (includes on-base facilities) | 0 | 1 - 25 | 26 - 100 | Greater than 100 | 4 |
| B. | Distance to nearest water well | Greater than 3 miles | 1 to 3 miles | 3,001 feet to 1 mile | 0 to 3,000 feet | 10 |
| C. | Land Use/Zoning (within 1 mile radius) | Completely remote (zoning not applicable) | Agricultural | Commercial or Industrial | Residential | 3 |
| D. | Distance to installation boundary | Greater than 2 miles | 1 to 2 miles | 1,001 feet to 1 mile | 0 to 1,000 feet | 6 |
| E. | Critical environments (within 1 mile radius) | Not a critical environment | Natural areas | Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination. | Major habitat of an endangered or threatened species; presence of recharge area; major wetlands. | 10 |
| F. | Water quality/use designation of nearest surface water body | Agricultural or Industrial use. | Recreation, propagation and management of fish and wildlife. | Shellfish propagation and harvesting. | Potable water supplies | 6 |
| G. | Ground-Water use of uppermost aquifer | Not used, other sources readily available. | Commercial, industrial, or irrigation, very limited other water sources. | Drinking water, municipal water available. | Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available. | 9 |
| H. | Population served by surface water supplies within 3 miles downstream of site | 0 | 1 - 50 | 51 - 1,000 | Greater than 1,000 | 6 |
| I. | Population served by aquifer supplies within 3 miles of site | 0 | 1 - 50 | 51 - 1,000 | Greater than 1,000 | 6 |

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

- S - Small quantity (<5 tons or 20 drums of liquid)
- M - Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
- L - Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

- C - Confirmed confidence level (minimum criteria below)
 - o Verbal reports from interviewer (at least 2) or written information from the records.
 - o Knowledge of types and quantities of wastes generated by shops and other areas on base.
 - o Based on the above, a determination of the types and quantities of waste disposed of at the site.
- S - Suspected confidence level
 - o No verbal reports or conflicting verbal reports and no written information from the records.
 - o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

| Hazard Category | Rating Scale Levels | | |
|-----------------|---|--|---|
| | 0 | 1 | 2 |
| Toxicity | Sax's Level 0 Flash point greater than 200°F | Sax's Level 1 Flash point at 140°F to 200°F | Sax's Level 2 Flash point at 80°F to 140°F |
| Ignitability | At or below background levels | 1 to 3 times background levels | Over 5 times background levels |
| Radioactivity | | | |

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

| Hazard Rating | Points |
|---------------|--------|
| High (H) | 3 |
| Medium (M) | 2 |
| Low (L) | 1 |

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

| Point Rating | Hazardous Waste Quantity | Confidence Level of Information | Hazard Rating |
|--------------|--------------------------|---------------------------------|---------------|
| 100 | L | C | M |
| 80 | L | C | M |
| | M | C | M |
| 70 | L | S | M |
| 60 | S | C | M |
| | M | C | M |
| 50 | L | S | M |
| | L | C | L |
| | M | S | M |
| | S | C | M |
| 40 | S | S | M |
| | M | S | M |
| | M | C | L |
| | L | S | L |
| 30 | S | C | L |
| | M | S | L |
| | S | S | M |
| 20 | S | S | L |

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
o Confirmed confidence levels (C) can be added
o Suspected confidence levels (S) can be added
o Confirmed confidence levels cannot be added with suspected confidence levels
Waste Hazard Rating
o Wastes with the same hazard rating can be added
o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCM = LCM if the total quantity is greater than 20 tons.
Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Multiply Point Rating
From Part A by the Following

Persistence Criteria

Metals, polycyclic compounds,
and halogenated hydrocarbons
Substituted and other ring
compounds 1.0
Straight chain hydrocarbons 0.5
Easily biodegradable compounds 0.4

C. Physical State Multiplier

Multiply Point Total from
Parts A and B by the Following

Physical State

Liquid 1.0
Sludge 0.75
Solid 0.50

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES,

III. PATHWAY CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

| Rating Factor | Rating Scale Levels | | | Multiplier |
|--|--|---|---|--|
| | 0 | 1 | 2 | 3 |
| Distance to nearest surface water (includes drainage ditches and storm sewers) | Greater than 1 mile | 2,000 feet to 1 mile | 500 feet to 2,000 feet | 0 to 500 feet |
| Net precipitation | Less than -10 in. | -10 to +5 in. | +5 to +20 in. | Greater than +20 in. |
| Surface erosion | None | Slight | Moderate | Severe |
| Surface permeability | 0 to 150 clay (>10 ⁻² cm/sec) | 150 to 300 clay (10 ⁻² to 10 ⁻¹ cm/sec) | 300 to 500 clay (10 ⁻¹ to 10 ⁻² cm/sec) | Greater than 500 clay (<10 ⁻² cm/sec) |
| Rainfall intensity based on 1 year 24-hr rainfall | <1.0 inch | 1.0-2.0 inches | 2.1-3.0 inches | >3.0 inches |

B-2 POTENTIAL FOR FLOODING

| | | | | |
|------------|----------------------------|------------------------|------------------------|-----------------|
| Floodplain | Beyond 100-year floodplain | In 25-year flood-plain | In 10-year flood-plain | Floods annually |
|------------|----------------------------|------------------------|------------------------|-----------------|

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

| | | | | |
|---|--|---|---|--|
| Depth to ground water | Greater than 500 ft | 50 to 500 feet | 10 to 50 feet | 0 to 10 feet |
| Net precipitation | Less than -10 in. | -10 to +5 in. | +5 to +20 in. | Greater than +20 in. |
| Soil permeability | Greater than 500 clay (>10 ⁻² cm/sec) | 300 to 500 clay (10 ⁻² to 10 ⁻¹ cm/sec) | 150 to 300 clay (10 ⁻¹ to 10 ⁻² cm/sec) | 0 to 150 clay (<10 ⁻² cm/sec) |
| Subsurface flows | Bottom of site greater than 5 feet above high ground-water level | Bottom of site occasionally submerged | Bottom of site frequently submerged | Bottom of site located below mean ground-water level |
| Direct access to ground water (through faults, fractures, faulty well casings, subsurface features, etc.) | No evidence of risk | Low risk | Moderate risk | High risk |

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

| <u>Waste Management Practice</u> | <u>Multiplier</u> |
|--|-------------------|
| No containment | 1.0 |
| Limited containment | 0.95 |
| Fully contained and in full compliance | 0.10 |

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

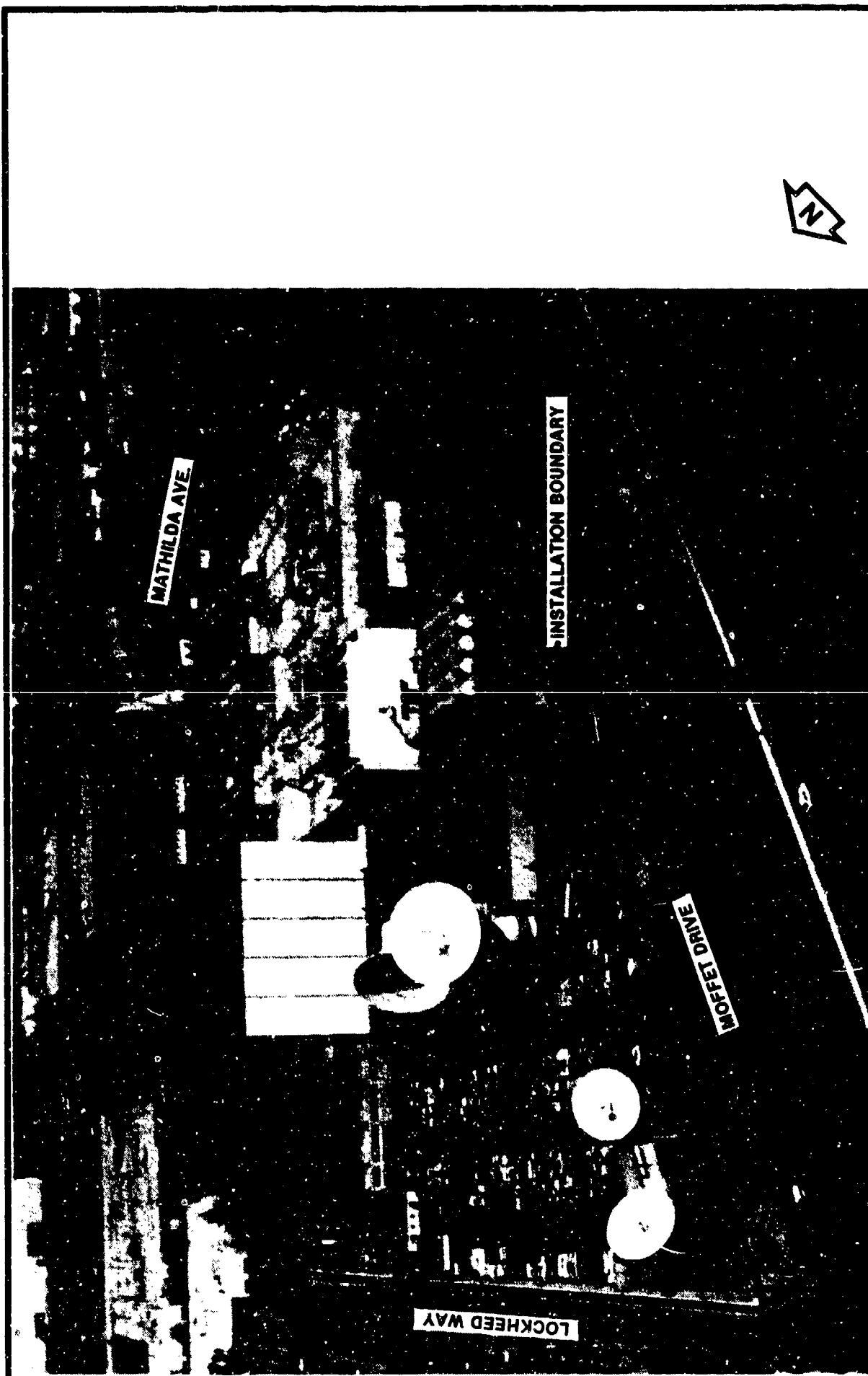
- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill
- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX H
PHOTOGRAPH OF SUNNYVALE AIR FORCE STATION



INSTALLATION
RESTORATION PROGRAM
SUNNYVALE AIR FORCE STATION

PHOTOGRAPH OF SUNNYVALE AIR FORCE STATION